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■ **Pesticide Action Network issues list of "Dirty Dozen" pesticides, urges alternatives be used.** Page 5

■ **Argonne's ATLAS is world's first superconducting accelerator for heavy ions.** Page 5

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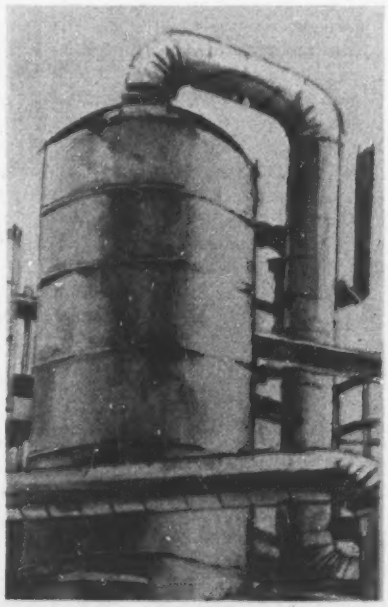

Facts & Figures

Neither the best of times nor the worst of times, 1984 saw some recovery for the U.S. chemical industry. C&EN's annual survey presents statistics that measure the industry's performance in both the U.S. and foreign countries. **Page 22**

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Growing Pains Give Biotechnology Firms Mixed Results in Quarter

Costs of commercialization lead many companies to seek financing through additional equity sales, more extensive licensing, and new ventures

David Webber, C&EN New York

First-quarter 1985 financial statements of biotechnology-based companies display a broad spectrum of performance. In contrast to 1984, when most of a group of 16 representative firms reported strong revenue increases each quarter compared to the year-earlier period, only nine of the companies had year-to-year revenue gains in this year's first quarter.

Most of the firms in the group are laboring to make the transition from research house to integrated manufacturing and marketing concern. Some, like Genentech, the biggest of the group, are still grooming development-stage products or awaiting regulatory approval for others. Consequently, most of their income still comes from research and development fees and, though diminished by falling rates, interest income. Others, wanting freedom to concentrate on proprietary product research, have taken the risky step of reducing their contract R&D commitments; as a result, revenues have dwindled.

Still others have left the familiar laboratory environs to tackle manufacturing and marketing. There, in some cases, unexpected costs and marketplace surprises have taken their toll on finances. Almost all members of the group, having lived off the cash amassed through their stock issues of several years ago, have felt the need to seek new capital. Some have been successful; some are still searching. Except for those that have bolstered their cash and marketables through equity sales and joint ventures, they have generally watched their interest income decline.

The diversity of results stems in part from this multiplicity of factors, factors essentially having to do with what particular stage a particular company now occupies in its movement toward commercialization. The differences in performance also reflect the differences in the individual firms' goals and the technologies they employ.

Some of the group, like Genentech, Cetus, and others, want to be pharmaceutical producers. Although recombinant DNA technology is most advanced in that area, significant delays to product launch stem from the need to conduct clinical trials and meet other regulatory obligations. Other firms aim to market agricultural products based on plant biotechnology. The principal methods in use—recombinant DNA, cell culture, and tissue culture—are less advanced in that area, and major products are consequently further from commercialization.

In terms of product sales as a percentage of all revenues, the furthest along are, in general, those companies using monoclonal antibody technology in diagnostics for humans and in both diagnostics and therapeutics for livestock. Such firms, like Hybritech and Monoclonal Antibodies Inc., continue to report steady, large gains in sales. The hitch for these companies is more long term: The ultimate market—for their current mix of products, at least—is expected to be much smaller than that for human therapeutic or crop products derived through biotechnology.

Fewer firms had higher revenues in first quarter

	FIRST-QUARTER 1985[a]					
	Revenues[b]	Earnings[c]	Change from 1984		Profit margin[d]	
	($ millions)		Revenues	Earnings	1985	1984
Amgen	$ 3.350	$−1.718	89%	def	def	def
BioTechnica International	1.225	−0.758	204	def	def	def
Bio-Technology General	0.285	−0.872	50	def	def	def
Biogen	4.864	−4.976	−19	def	def	def
California Biotechnology	2.000	−0.109	0	def	def	4.4%
Centocor	4.480	0.497	77	8183%	11.1%	0.2
Cetus	12.628	0.211	5	95	1.7	0.9
Collaborative Research	2.215	−1.060	11	def	def	def
Damon Biotech	0.675	−2.995	−52	def	def	def
Genentech	20.164	0.715	32	86	3.5	2.5
Genex	4.795	−2.300	−11	def	def	def
Hybritech	11.964	0.366	97	165	3.1	2.3
Immunex	0.611	−1.276	−7	def	def	def
Molecular Genetics	2.339	−0.479	−10	def	def	def
Monoclonal Antibodies	1.525	−0.393	133	def	def	def
Ribi ImmunoChem	0.161	−0.188	−31	def	def	def

a For three-month period ending closest to March 31. b Includes sales, contract research, royalty, and interest revenues. c Excludes extraordinary credits. d After-tax income as a percentage of revenues. def = deficit.

For all members of the group, increasing attention was paid to controlling costs. Spurred by the looming threat of a long-predicted industry shakeout and increasing competition from the large chemical and pharmaceutical corporations that are conducting biotechnology research themselves, the smaller companies are faced with the need to spend more on R&D, manufacturing facilities, and marketing forces at the same time that their cash reserves may be shrinking and product or royalty income is still meager. For that reason, several firms traded both proprietary positions and equity for a little more financial security.

California Biotechnology, for example, which recorded no gain in revenues along with a loss compared to a small profit in the same quarter a year earlier, sold 1 million shares, or about 15% of its common stock, to American Home Products, the health-care-products giant, for $12 million in mid-April.

"American Home's equity investment will augment Cal Bio's capital position, thereby accelerating the company's ability to enlarge its research activities and to develop and exploit its creative capacity to discover and introduce new therapeutic products," said William G. Baker Jr., chairman of the Mountain View, Calif.-based company.

At the same time, California Biotechnology granted American Home Products' Wyeth Laboratories an exclusive worldwide license to market any cardiovascular and diuretic therapeutic agents produced by a joint research program to be established between the two operations. The particular object of the joint R&D effort will be the further development of Auriculin, Cal Biotech's version of a hormone secreted by the atrium of the heart. The company says Auriculin has shown promising results in lowering blood pressure, reducing water and salt from the body, and enhancing the efficiency of the kidneys.

Genentech, South San Francisco, boosted its current assets 148% through two stock sales during the first quarter. One, a public offering of 1.15 million shares of common stock, netted $50 million. The second, a private placement, transferred just under 5% of the company's outstanding shares to Boehringer Ingelheim International for $40 million. Having raised money this way, cash-rich Genentech can drive better licensing bargains. For example, it reached commercialization agreements covering Europe and Japan for its tissue necrosis factor, a possible anticancer agent due for clinical trials this summer, but kept North American marketing rights for itself.

In the first quarter, Genentech increased revenues 32%, entirely via higher contract R&D receipts. Net income rose 86% to $715,000.

Cetus reported a 5% increase in revenues, mostly the result of higher R&D contract income from joint ventures with W. R. Grace (Agracetus) and Nabisco Brands. At the same time, the Emeryville, Calif., company kept growth in costs and expenses below 4%.

"The quarterly results are consistent with the company's goal and commitment to maintain its financial strength by using its financial resources prudently," comments Hollings C. Renton, Cetus vice president for finance. "Despite higher costs from human clinical testing, the marginal growth in expenses demonstrates management's efforts to control operating costs."

At Amgen, Thousand Oaks, Calif., current assets declined sharply over the 12-month period ending March 31, contributing to a 41% decline in interest income. At the same time, however, the company raised R&D contract revenues 291% to $2.6 million and more than doubled product sales to $92,000. The result: Total revenues climbed 89% in the first quarter.

Damon Biotech, Needham Heights, Mass., posted a 52% decline in revenues at the same time that expenses ballooned 82%. As a result, the firm's first-quarter loss jumped to nearly $3 million (excluding a federal income tax benefit), up 383% from the same quarter in 1984. Nevertheless, the company, which sells monoclonal antibodies under contract, monoclonal scaleup technology, and is researching human therapeutic applications for monoclonals, remains confident.

"At the close of the quarter, our backlog of monoclonal antibody orders exceeded $2 million, a record high for the company," comments David I. Kosowsky, chief executive officer. "In addition, our current production rate for antibodies is substantially above last quarter's." Kosowsky also notes that the company has increased its customer base worldwide. In early April, a marketing operation was established in Tokyo.

Concentrating exclusively on the more-developed human diagnostic business, Monoclonal Antibodies Inc. maintained its strong pace of sales increases in first-quarter 1985. Unlike many other young biotechnology-based companies, the Mountain View, Calif.-based firm derives most of its revenues from product sales. In the fiscal year that ended March 31, for instance, 76% of revenues came from sales of proprietary products. In the quarter, revenues rose 133% to $1.5 million. At the same time, the company pared expenses.

Indications of rough going continue to arrive from Genex, on the other hand. The Rockville, Md., firm, which has focused its expertise on specialty chemicals, lost $2.3 million in the first quarter, better than fourth-quarter 1984's $7.5 million deficit, but still worse than the $2.1 million lost a year earlier. The firm, whose chief product is L-phenylalanine, may have overextended itself in building a $25 million facility to produce the aspartame precursor. With only one customer, G. D. Searle, plenty of competition, and industry overcapacity, phenylalanine prices have been weak, and volume has not been high enough to maintain a healthy cash flow.

Between the end of 1983 and the end of March 1985, Genex's current assets plummeted to $8.9 million from $30.2 million. Now the company is seeking new financing, is selling some undeveloped property, and may have to leverage its new plant in some way. There are also takeover rumors. The company believes the worst is behind it now, however, and projects improvement for the rest of the year—not net income, but at least a lower net loss than 1984's $7.4 million deficit. □

Magnesium outlook continues to be bright

"A rising star in a sky of falling metals." That's how Pierre Gousseland, chairman and chief executive officer of AMAX Inc., describes magnesium. Certainly its vital statistics for 1984 earn magnesium that accolade.

Although most segments of the metals industry are troubled with overproduction, excessive inventories worldwide, and depressed prices, magnesium is a welcome exception. Primary magnesium production in noncommunist nations rose last year almost 40% from 1983 to 232,100 metric tons. Consumption also increased, rising to 216,000 metric tons last year from 169,000 metric tons in 1982.

Speaking at the recent World Magnesium Conference sponsored by the International Magnesium Association in New York City, Gousseland attributed magnesium's success to its versatility. The metal's light weight, dimensional stability, good machinability, and excellent damping capacity all help to make magnesium an effective alternative to aluminum and other metals, he says.

Claude Y. M. Guillam, sales director of Pechiney Electrometallurgie's magnesium division, adds still another reason. He says that the driving force for magnesium's recovery in 1983 and last year was the strong North American economy. North America accounts for about half of noncommunist countries' magnesium consumption.

With both these factors driving its growth, magnesium is on a roll, with most of the increase in demand coming from die casting and steel desulfurization. Guillam expects this trend to continue for the next five years. He estimates that magnesium consumption in noncommunist countries will increase 4.6% to 226,000 metric tons this year and reach 260,000 metric tons by 1989—20% higher than last year's level.

By 1989, magnesium capacity in noncommunist countries will have grown to an estimated 313,000 metric tons from this year's 285,000 metric tons. This, says Guillam, should be enough reserve capacity to allow for unexpectedly rapid growth in one or more of magnesium's end-use areas.

This reserve capacity could well be needed. Alloying with aluminum now accounts for more than half of magnesium consumption and will remain by far the largest outlet. But Gousseland says that magnesium producers can't continue to depend upon one industry—aluminum—for most of its sales growth.

They aren't. Two other outlets, die casting and steel desulfurization, are earmarked for considerable growth. Producers have devoted a lot of attention to pressurized die casting and now are offering better high-purity alloys to improve corrosion resistance. New applications, says Guillam, crop up regularly, especially in the automotive and electronics industries. He says that magnesium consumption for die casting will increase 20% this year from last year to 36,000 metric tons and will hit 45,000 metric tons by 1989.

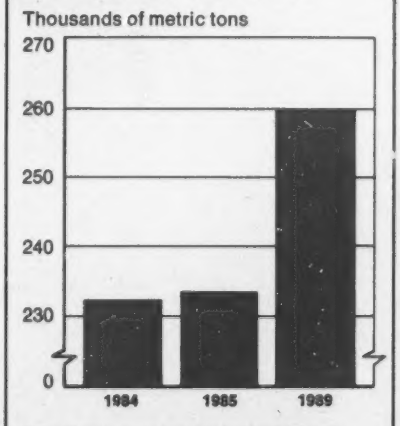
Gousseland says that magnesium's future in die casting is bright because magnesium die-casting alloy solves weight and durability problems. He also notes that, because of rising electric power costs, aluminum producers are recycling can scrap into new cans rather than channeling the metal to secondary producers for die-casting alloy. This, he says, could open the door even further for magnesium alloys as the price of secondary aluminum alloys rises.

Desulfurization also holds promise for major growth for magnesium. In North America, 70% of hot metal desulfurization is now done with magnesium, according to Gousseland. He believes that by 1988 most North American steel mills will have committed themselves to magnesium desulfurization. So, he says, will a number of European producers.

Desulfurization, in fact, already has become a major market for magnesium. Guillam notes that, as recently as 1982, desulfurization accounted for only 5% of magnesium consumption. It now accounts for 8% and, with a growth rate projected at 15% annually, will account for 12% of magnesium consumed in five years.

Guillam agrees that, although North American steel producers were the first to embrace magnesium desulfurization, Western European producers are now embracing it because of its economic edge. In North America, steelmakers choose pure magnesium powder or precoated magnesium granules. In Europe, the technology is somewhat different, says Guillam. There, magnesium powder is combined with a slag or coinjected with calcium carbide powder. □

Magnesium output to grow strongly in late 1980s



Note: Figures for noncommunist countries only.

Aluminum alloying is biggest use of magnesium . . .

Thousands of metric tons	1984	1985[a]	1989[a]
Aluminum alloying	118	116	123
Nodular iron	10	12	14
Desulfurization	17	21	32
Chemical/reduction	28	27	30
Pressure die casting	30	36	45
Other structural	6	9	11
Other	7	5	5
TOTAL	216	226	260

. . . and North America is its biggest market

Thousands of metric tons	1984	1985[a]	1989[a]
North America	110	113	123
Latin America	8	9	13
Western Europe	67	70	85
Africa/Middle East	2	2	4
Asia/Oceania	29	32	35
TOTAL	216	226	260

a Forecasts. Note: Primary magnesium consumption in noncommunist countries only. Source: International Magnesium Association

Interest Heightens in Development Of Eastern Oil Shale Resources

Coupled with beneficiation and hydrogenation, eastern shale continues to show promise as source of oil as energy shortages approach

Joseph Haggin, C&EN Chicago

Eastern oil shale is among the lesser known alternative energy sources in the U.S., but it may become one of the first big producers of liquid fuels. Despite major legislative and economic hurdles that make the development climate rather gloomy, eastern shale is showing remarkable resilience as the federal budget for fiscal 1986 is pounded into shape.

Eastern oil shale is generally considered to be that shale formed during the Devonian era and lying east of the Mississippi River. The principal deposits are found in Alabama, Indiana, Kentucky, Michigan, Ohio, and Tennessee, with some marginal beds in Illinois and Pennsylvania.

Although it has been known at least since the Civil War, eastern shale has not generated the interest shown in the western shales, mostly in Colorado and Utah. Because of substantial differences between eastern and western shales and because shale development has emphasized western shales, eastern shales have been considered of marginal quality. The recovery technology for western shales is different from that for eastern shales, and only in very recent years has it been realized that although the technologies differ, eastern shale probably has as much energy potential as any other.

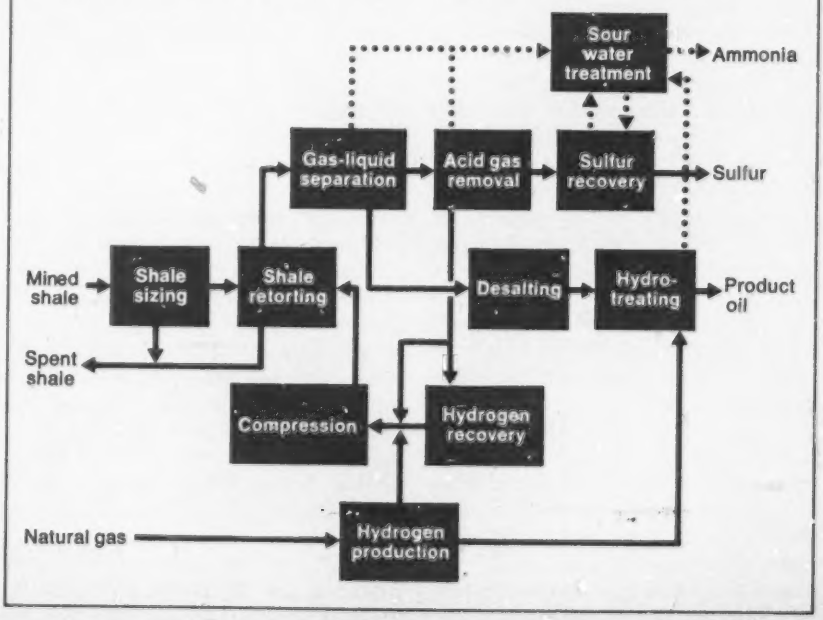
Development of eastern shale resources expanded at a time when there was an "oil glut" and a "gas bubble." The resulting hiatus in alternative energy development has lulled many people into a false sense of security. But that period probably is about over. In testimony before the House Subcommittee on Interior & Related Agencies, Bernard S. Lee, president of the Institute of Gas Technology, warned that there are already signs that the present period of energy surpluses is at an end.

In 1984, the demand for oil and gas began to rise again, and oil imports rose 9%. Lee cites a Department of Energy forecast for a 20% increase in U.S. petroleum consumption by 1995 and a 70% increase in imports during the same period. Legislators appear reluctant to reinforce R&D funding for alternative energy sources. However, a consensus among the professional engineering community leaves little doubt that failure to increase and develop alternative energy options now could lead to serious problems in the near future.

A typical assessment of the eastern shale potential comes from Jack Clark, consulting engineer for the Mineral Resources Institute at the University of Alabama. Clark sees eastern shale as a developable resource in the next 10 to 15 years, if the effort is begun now. Clark believes that the key to development is beneficiation, although eastern shale also may be processed without beneficiation.

As it now appears, conventional retorting of eastern oil shale could yield 12 gal of synthetic crude per ton of shale. Clark suggests that with beneficiation, yield could be increased to 30 gal per ton. With hydrogenation the yield could be further increased to 60 gal per ton.

Hytort plant mostly uses conventional unit operations



Beneficiation, says Clark, is essentially a matter of grinding the raw shale before retorting and concentrating the organic portions by some process such as froth flotation. The inorganic portions may be returned to the mine without treatment and have no known environmental effects. Clark notes that the penalty for beneficiation is probably less than 100 kWh per ton of shale ground. The subsequently greater yields usually mean there is a net gain because of a more-than-compensating downstream energy requirement. There is also a considerably lower water requirement. Most of the energy saved downstream results from elimination of the need to heat and/or cool a lot of inert material. It's currently estimated that about 75% of the original as-mined inert material can be removed by beneficiation.

Retorting of upgraded shale is further enhanced by hydrogenation to increase the hydrogen-to-carbon ratio. The hydrogen can be obtained from any source, but those of greatest current interest are methane reforming and the water gas shift reaction. The Mineral Resources Institute is developing a process utilizing the water gas shift reaction to provide hydrogen for shale retorting.

A definitive survey of eastern shale resources is not available, but enough is known to allow Clark to project the lifetime of the minable shale resources in the eastern U.S. to be about 500 years, much of it by surface mining. Some of the more liberal estimates suggest that eastern shale oil could compete with a world oil price of $40 per barrel. With beneficiation of the shale, the shale oil might be competitive at $30 per bbl. If this appears lower than previous estimates for western shale oil, some of the reasons cited are availability of ample process water in the East and lower transportation costs, with markets for products being nearby.

Clark believes that the greatest current need is for good, integrated processes that use beneficiated shale and hydrotreating. Such processes should be of large scale and must operate continuously. That all boils down to building a demonstration plant large enough to identify and remove the bugs and glitches that always come with an enterprise of this type.

Hytort can recover large amounts of eastern shale oil

State	Mining area,[a] square miles	Resources,[b] billions of barrels
Kentucky	2850	190
Tennessee	1540	44
Ohio	980	140
Indiana	600	40
Michigan	160	5
Alabama	300	4
TOTAL	6230	423

[a] Total area suitable for surface mining. [b] Recoverable by above-ground hydrotorting. Source: Institute of Gas Technology

The Mineral Resources Institute and other groups are pursuing process development, but the leading contender at the moment is probably the Hytort process. Hytort is being commercialized by Hycrude Corp., a subsidiary of GDC Inc., which is a unit of the Institute of Gas Technology.

In the Hytort process, run-of-the-mine shale is ground and classified. The fraction between 0.125 inch and 1 inch constitutes the feed to the retort. Fines are either returned to the mine or treated separately to generate hydrogen-bearing oils or plant fuels. The coarse fraction is recycled. Shale is fed to the retort, which is a countercurrent, vertical, moving-bed contactor. It operates at elevated pressure, making it necessary to feed the shale into the system as a water slurry. The slurry is dewatered before the shale actually enters the retort, and the water is recycled.

Product gases are cooled and the oil and water are separated by decanting. Other acid gases are removed conventionally, and the hydrocarbon gases are used as a hydrogen source or plant fuel. Hycrude presently assumes that the hydrogen source of preference will be methane (natural gas), although any other source may be utilized. For a 50,000 bbl-per-day Hytort plant about 180 million standard cu ft per day of hydrogen is necessary.

An appealing aspect of the integrated processes is the prospect of recovering a number of strategically important metals as by-products, including aluminum, iron, cobalt, chromium, manganese, molybdenum, nickel, niobium, uranium, and vanadium. An auxiliary process, suggested for use with Hytort, would acid-leach the spent shale with acid derived from the by-product sulfur. Metal values then would be recovered from the leachate by solvent extraction and precipitation.

A projected Hytort plant producing 50,000 bbl per day of raw oil would cost about $2.3 billion and have annual operating costs of about $413 million. A 20% return on investment might be realized at an oil selling price of $43.20 per bbl. It would take about five years to build the plant, which would have an expected lifetime of 20 years.

As the proponents of western shale have experienced since the 1950s, bringing a process to the marketplace requires the active aid of the federal government, particularly where demonstration plants are concerned. Current Department of Energy funding proposals are keyed heavily to development of western shale, but $3 million was provided in the fiscal 1985 budget to "expand the eastern shale database." A group of eastern shale proponents has suggested that this be increased to $9 million in 1986, to $10 million in 1987, and $11 million in 1988. These funds would be distributed among fundamental research, advanced research, and environmental studies. Individual states with shale potential would be given considerable discretion in some aspects of the program.

As defined by the program, fundamental research supports new technologies that have potential for better utilizing eastern shale, as well as obtaining basic geochemical data on the resources. Advanced research deals with improving existing promising technology and designing process development units of a size large enough to allow for final scale-up to commercial size.

Advocates of eastern shale development say they have a strong case to make in their request for continued funding. Numerous processes have been developed in bench-scale units by Battelle, Allis-Chalmers,

SISO, Rockwell, SRI International, Cities Service, and others. The availability of water, proximity to mines and markets, availability of labor, relative ease of mining, possibility of significant by-product credits, and minimum environmental upset are characteristics of eastern shale. One process in development, namely the Hytort process, is now actively being commercialized, meaning that the developers are confident enough to put it on the market. □

Unit speeds up vitamin, antibiotic assays

Eli Lilly's Elanco Products Co. division is about to bring out a new generation of its Autoturb microbiological assay system, dubbed appropriately Autoturb II. It is, the company says, "computer ready."

The system automates the process for turbidimetric analysis for potency of antibiotics, vitamins, and related substances. Lilly somewhat backed into being a supplier of the system originally. Looking to its own needs, the company made a prototype of the first model in 1968, with its first production model appearing in 1970. But it isn't waiting for word-of-mouth requests to get sales of Autoturb II off and running. Elanco is now taking orders for the custom-made units, with delivery to begin in the fourth quarter of 1985.

Technician places test racks ready for assay in Autoturb II reader unit

With the new system, microprocessors are used for control and monitoring. An RS-232C serial port is included for transmission of test data to a user's computer, and there is a built-in blue dye calibration routine. The Autoturb II, Elanco says, operates about 20% faster than the original model.

An antibiotic assay is based on inhibition of the growth of susceptible microorganisms by that antibiotic in an inoculated growth medium. A comparison of the antibiotic activity of a sample with that of a known standard permits the potency level of the antibiotic to be calculated.

For assaying vitamins (or amino acids), a different approach is required. In this case, the medium used is deficient in the substance to be measured.

The Autoturb II consists of two modules—a diluter and a reader. A technician manually prepares test tubes containing the sample and reference standard material. The diluter module then automatically prepares desired dilutions of both with inoculated growth medium. After inoculation, test tubes are incubated to enhance growth of the microorganism. In antibiotic assays, growth is terminated, usually by heat.

The incubated tubes are then placed in the reader module, where turbidity of the killed suspension is measured spectrophotometrically. A user-supplied computer linked to the Autoturb II compares the spectrophotometer readings of sample and reference standard to determine potency of the material being tested.

The Autoturb II can handle 20 samples and standards of four dilutions each—a total of 80 tubes—at one time. Each of several operators can assay 100 samples in an eight-hour day—double the output of manual methods, Elanco says. The company figures that the automated system saves a total of 81 minutes compared with manual methods for each 80-tube test.

Except for bacitracin, which gives a bias, all antibiotics can be assayed with the Autoturb II system, including cephalosporins. It can also be used for handling vitamins B_{12}, folic acid, niacinamide, pyridoxine (B_6), pantothenic acid, and panthenol.

Price of the Autoturb II is $49,800. Included are the two modules, one test tube tray for samples, five test tube racks for assays, and one waste trough. □

New Sartorius balance series available in U.S.

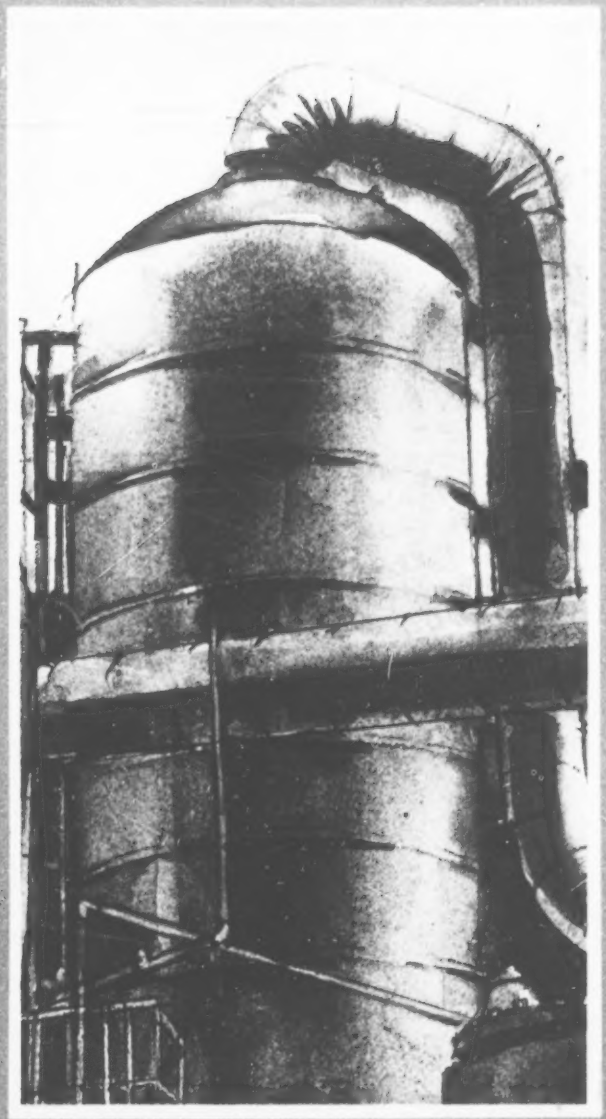
Two series of automatic analytical balances from West Germany's Sartorius have been introduced in the U.S. by Brinkmann Instruments Co.

The first series, economically priced for routine work and teaching laboratories, includes a balance of 110-g capacity, readable to 0.1 mg, priced at $1695. A companion balance reads to 0.1 mg from 0 to 60 g, to 0.2 mg from 60 to 100 g, and to 0.5 mg from 100 to 160 g, priced at $1875. The 0.1-mg readability can be re-established in any region of the 160-g capacity by pressing the tare button.

The second series has larger weighing chambers, greater capacities, and finer readabilities for more demanding work. One balance, priced at $2495, reads to 0.1 mg up to a 200-g capacity. A second, which costs $2995, reads to 0.01 mg from 0 to 30 g and to 0.1 mg from 30 to 160 g, with the finer readability reestablished over the whole capacity range on pressing the tare button. The third balance, with a $2495 price tag, reads to 0.1 mg from 0 to 100 g, to 0.2 mg from 100 to 200 g, and to 0.5 mg from 200 to 300 g. Again, the finest readability can be selected over the whole capacity range by pressing the tare button.

Brinkmann also offers such options for these balances as RS-232C serial data links, printers, interfaces to many common microcomputers, and external keyboards for remote, dedicated uses like counting, animal weighing, units conversion, statistical analyses, density determinations, and formulation and compounding. □

Facts & Figures



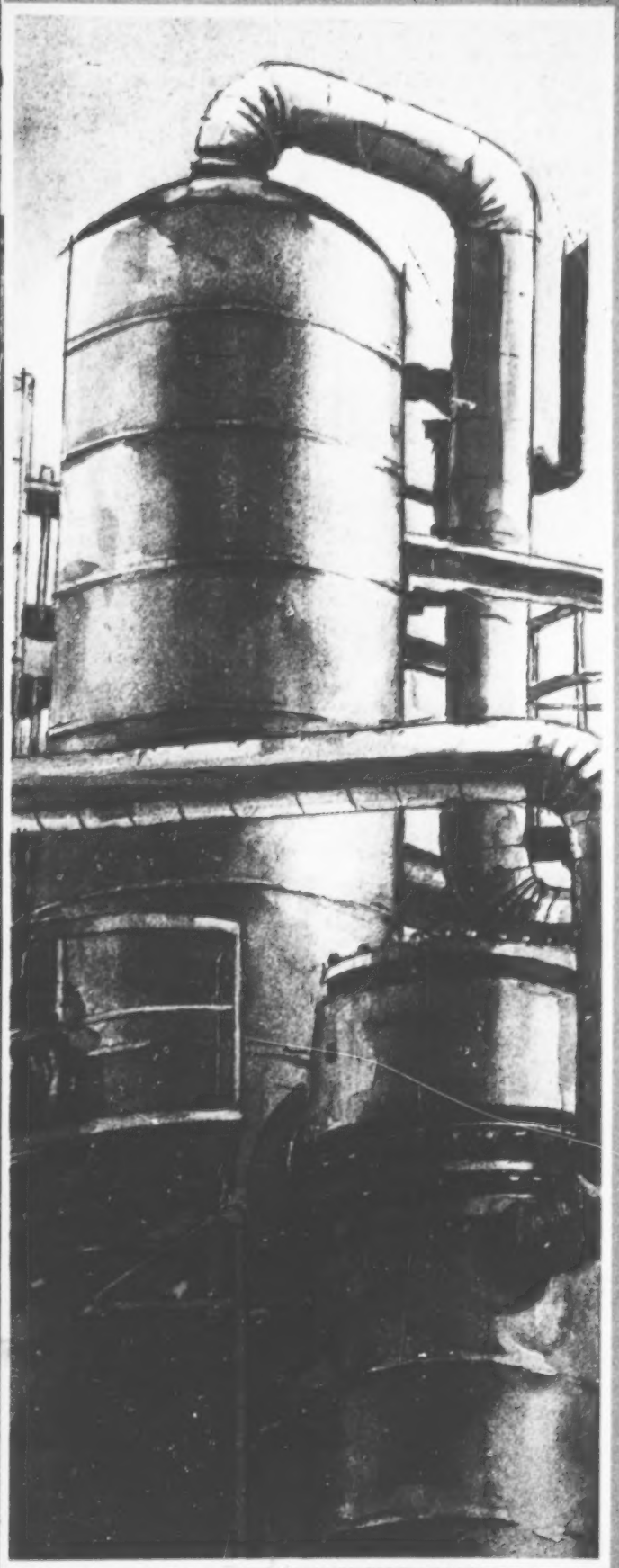
for the chemical industry

For the U.S. chemical industry, 1984 certainly was not the worst of times. But it definitely was not the best of times either.

Production largely has recovered from the lows of the 1981–82 recession. But having done that, further progress has been labored. Growth has slowed perceptively or disappeared entirely. Output during early 1985, in fact, is essentially unchanged from the first part of last year. Sales have slipped and profits are below those of early 1984 for the industry as a whole. Perhaps the past year can best be described as a period of stagnant prosperity or prosperous stagnation.

One of the industry's most intractable problems—in addition to slackening demand in its home markets—is the continued strength of the U.S. dollar relative to major foreign currencies. As a result, exports have lost their competitive edge, imports have been gaining market share, and profits from overseas chemical operations, when translated into dollars, have been increasingly anemic. Although industry executives remain optimistic that renewed economic growth will ease their plight during 1985's second half, the year as a whole is not likely to go into the books as anything much more than a standoff.

The following pages of C&EN's annual Facts & Figures issue present statistics to measure the industry's recent performance both in the U.S. and in foreign countries. The data come from a wide array of sources, including government agencies, trade groups, international organizations, and the companies in the chemical and related industries. In many cases, these data have been treated to develop analytical measures and comparisons that add perspective to the industry's results.



at a glance

Section One: Production

Output in the U.S. chemical industry was up last year, but the growth rate eased as the year advanced and, for 1984 as a whole, gains were relatively moderate. Plastics had the best growth overall, with some of the lower-volume materials setting the pace. Among inorganic chemicals, fertilizer materials made a sharp recovery after two severely depressed years. On the other hand, man-made fibers, crimped by imports, had little or no growth. **Page 24**

Section Two: Finance

Profits were higher for chemical producers in the U.S. By late 1984, however, growth had run out of steam. Consequently, profits remained well below levels of just four or five years ago. Basic chemical companies, however, are fattening their capital spending budgets, although with current capacity still more than adequate for products, outlays are still less than in the early 1980s. For R&D, conversely, budgets continue to grow steadily and this year will set a new high. **Page 32**

Section Three: Employment

The workforce employed by the chemical industry expanded in 1984, but most of the growth took place during the first half and by year's end the number of employees was still far less than in 1981. Productivity of workers also was higher, but the gain was only a little better than a third of that made in 1983. **Page 47**

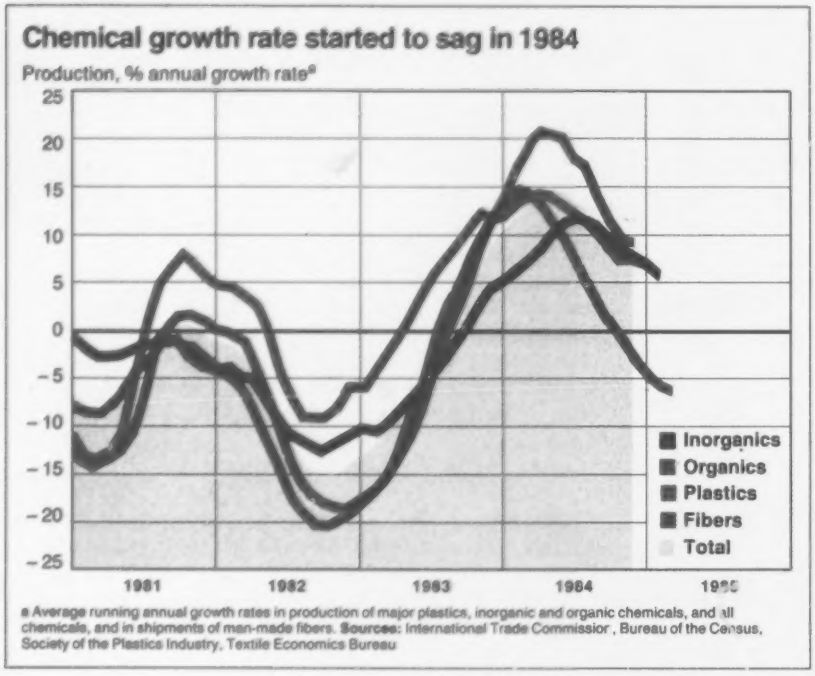
Section Four: Foreign Trade

World trade in chemicals rose to an all-time high last year, increasing 14%. U.S. exports did nearly as well, recording a 13% increase. But imports of chemicals flooded into the U.S. as the dollar continued to strengthen. As a result, the nation's surplus in chemical trade was trimmed for the fourth year. **Page 50**

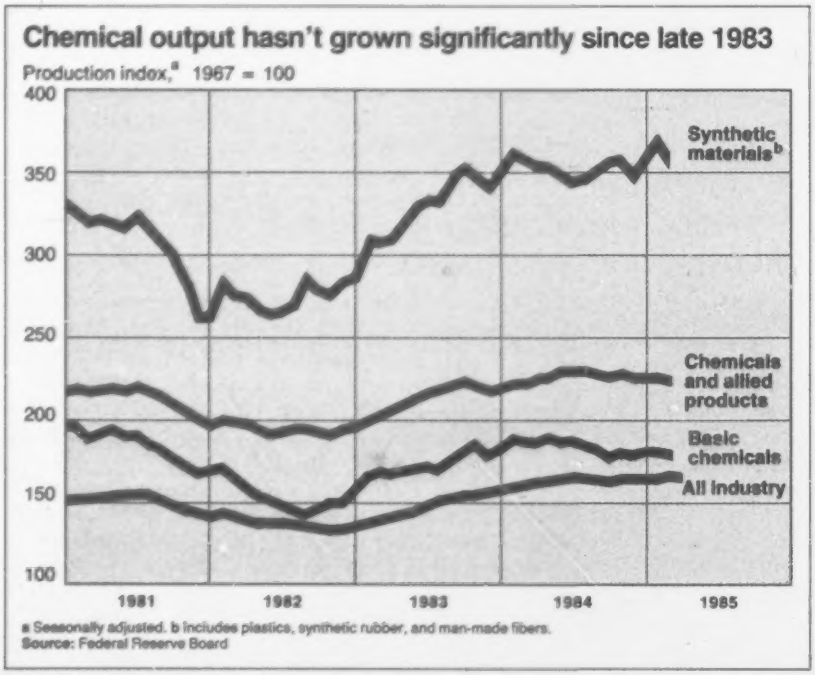
Section Five: Foreign Chemical Industries

Continued growth was widespread among the world's chemical producers. Higher production and sales, moreover, fattened the previously depressed earnings of companies in Western Europe, Japan, and Canada. Even so, competition continued to be keen in world markets and excess capacity remains a problem that is still only partially resolved. **Page 52**

Production increased only weakly in 1984



a Average running annual growth rates in production of major plastics, inorganic and organic chemicals, and all chemicals, and in shipments of man-made fibers. **Sources:** International Trade Commission, Bureau of the Census, Society of the Plastics Industry, Textile Economics Bureau



a Seasonally adjusted. b Includes plastics, synthetic rubber, and man-made fibers.
Source: Federal Reserve Board

Output of U.S. chemical plants increased 6% last year as compared with 1983. But although the chemical industry as a whole saw slow but steady growth in production at the beginning of 1984, the second half of the year and the early months of 1985 brought stagnation.

Plastic materials and synthetic rubber made the strongest gains of all the industry sectors in 1984, with plastics production rising to a new high for the second year in a row. Output of thermoplastic resins increased 15%, led by a 23% increase in nylon, and thermosetting resin production was up 6% overall. Synthetic rubber production also increased for the second year in a row, with output of nitrile and ethylene-propylene rubber growing more than 20%. Rubber output, however, is still below levels of a decade ago.

Among man-made fibers, only the output of rayon, olefins, and textile glass fibers rose in 1984. Production of the other major cellulosics and noncellulosic fibers either decreased or was unchanged from a year earlier. The strength of the U.S. dollar has undercut U.S. exports and opened U.S. markets to a rising flood of foreign-made fibers, textiles, and apparel.

Production of basic chemicals was up in every category in 1984, but grew only 6% overall and was still below 1981 levels. Acids and fertilizer materials showed the strongest growth, up 12% over the previous year. This reflects a 20% increase in fertilizer use in the U.S. last year, after two years of declining consumption.

Output of other chemical products increased 6%, the industry average for 1984. Production of agricultural chemicals, the only sector to decrease in output during 1983, grew 10% last year. Paint production was up 11%. Drugs, soaps, and toiletries expanded less than average.

TOP 50 CHEMICALS: Rise in output last year was well above average rate for the past decade

Rank 1984	Rank 1983[a]		Billions of lb 1984	Billions of lb 1983	Common units[b] 1984	Common units[b] 1983	Average annual growth 1983–84	1982–83	1979–84	1974–84
1	1	Sulfuric acid	79.37	73.17	39,683 tt	36,583 tt	8.5%	10.1%	−1.7%	1.6%
2	2	Nitrogen	43.41	40.58	599 bcf	560 bcf	7.0	15.9	7.0	9.4
3	6	Ammonia	32.41	28.14	16,204 tt	14,072 tt	15.2	−10.9	−2.8	0.3
4	3	Lime[c]	32.20	29.73	16,100 tt	14,867 tt	8.3	5.6	−5.1	−2.3
5	4	Ethylene	31.18	28.68	31,178 mp	28,677 mp	8.7	17.0	0.8	2.7
6	5	Oxygen	31.04	28.39	375 bcf	343 bcf	9.3	−1.7	−3.8	0.4
7	7	Sodium hydroxide	22.45	20.46	11,224 tt	10,230 tt	9.7	9.0	−2.6	0.0
8	9	Phosphoric acid	22.22	19.53	11,111 tt	9,767 tt	13.8	18.3	1.5	4.4
9	8	Chlorine	21.45	19.92	10,724 tt	9,960 tt	7.7	8.5	−2.6	0.0
10	10	Sodium carbonate[d]	17.02	16.93	8,511 tt	8,467 tt	0.5	8.3	0.6	1.2
11	12	Nitric acid	16.08	13.94	8,041 tt	6,968 tt	15.4	−5.7	−2.0	0.1
12	11	Propylene	15.47	13.96	15,470 mp	13,959 mp	10.8	11.4	1.7	4.0
13	14	Urea[e]	14.30	12.27	7,148 tt	6,137 tt	16.5	−5.1	0.4	6.9
14	13	Ammonium nitrate[f]	14.01	12.48	7,005 tt	6,240 tt	12.3	−12.0	−3.3	0.7
15	15	Ethylene dichloride	13.73	11.51	13,731 mp	11,506 mp	19.3	51.0	3.1	4.1
16	16	Benzene	9.86	9.08	1,339 mg	1,233 mg	8.6	17.2	−4.3	−1.0
17	18	Ethylbenzene	8.61	7.88	8,613 mp	7,876 mp	9.4	18.3	0.4	3.6
18	17	Methanol	8.28	7.98	8,280 mp	7,982 mp	3.7	5.7	2.4	1.9
19	19	Carbon dioxide[g]	7.80	7.76	3,898 tt	3,880 tt	0.5	1.6	5.5	8.0
20	21	Styrene	7.71	6.80	7,706 mp	6,802 mp	13.3	14.5	0.6	2.6
21	20	Vinyl chloride	7.51	6.88	7,513 mp	6,875 mp	9.3	40.2	3.3	2.9
22	26	Xylene	6.12	5.23	850 mg	726 mg	17.1	10.3	−2.6	0.6
23	23	Terephthalic acid[h]	6.05	5.63	6,047 mp	5,626 mp	7.5	16.2	0.4	3.6
24	24	Ethylene oxide	5.96	5.53	5,957 mp	5,534 mp	7.6	11.0	0.7	3.4
25	27	Hydrochloric acid	5.72	4.84	2,862 tt	2,420 tt	18.3	−1.2	−1.5	1.5
26	25	Formaldehyde[i]	5.71	5.47	5,712 mp	5,465 mp	4.5	13.5	−0.9	−0.1
27	22	Toluene[j]	5.27	5.66	726 mg	780 mg	−6.9	9.2	−6.4	−2.4
28	28	Ethylene glycol	4.84	4.43	4,842 mp	4,425 mp	9.4	2.7	0.5	3.8
29	29	*p*-Xylene	4.27	4.11	4,268 mp	4,114 mp	3.7	28.3	−1.7	4.7
30	30	Ammonium sulfate	4.13	3.91	2,063 tt	1,956 tt	5.5	10.6	−2.7	−0.3
31	32	Potash[k]	3.53	3.15	1,600 tmt	1,429 tmt	12.0	−19.9	−6.4	−4.6
32	31	Cumene	3.36	3.35	3,360 mp	3,345 mp	0.4	21.9	−3.0	1.5
33	35	Carbon black	2.89	2.50	2,893 mp	2,496 mp	15.9	8.4	−2.8	−1.5
34	34	Phenol[l]	2.85	2.64	2,845 mp	2,637 mp	7.9	30.4	−0.9	2.0
35	33	Acetic acid	2.64	2.81	2,642 mp	2,807 mp	−5.9	2.1	−4.1	0.2
36	36	Butadiene[m]	2.53	2.35	2,531 mp	2,353 mp	7.6	22.9	−6.7	−3.7
37	38	Acrylonitrile	2.20	2.15	2,201 mp	2,146 mp	2.6	5.5	1.8	4.5
38	37	Aluminum sulfate	2.16	2.21	1,079 tt	1,103 tt	−2.2	−4.3	−3.9	−1.5
39	44	Cyclohexane	2.13	1.66	2,130 mp	1,656 mp	28.6	29.9	−2.6	−1.0
40	42	Calcium chloride[n]	2.10	1.71	1,049 tt	857 tt	22.4	0.5	1.3	−0.5
41	39	Vinyl acetate	2.02	1.96	2,023 mp	1,963 mp	3.1	4.6	0.4	3.7
42	41	Propylene oxide	1.90	1.80	1,900 mp	1,800 mp	5.6	7.1	−3.3	0.8
43	40	Acetone	1.89	1.86	1,887 mp	1,859 mp	1.5	9.7	−6.6	−0.5
44	43	Sodium sulfate[o]	1.74	1.71	872 tt	854 tt	2.1	−1.2	−4.9	−4.3
45	45	Titanium dioxide	1.60	1.51	799 tt	757 tt	5.5	15.2	1.5	0.2
46	46	Sodium silicate	1.50	1.46	750 tt	728 tt	3.0	9.6	−1.6	−0.3
47	—	Methyl *tert*-butyl ether[p]	1.47	0.84	1,469 mp	839 mp	75.1	1.8	nm	nm
48	48	Adipic acid	1.39	1.28	1,390 mp	1,280 mp	8.6	10.6	−4.4	−0.6
49	47	Sodium tripolyphosphate	1.33	1.34	667 tt	669 tt	−0.3	2.8	−2.5	−3.0
50	49	Isopropyl alcohol	1.15	1.21	1,147 mp	1,209 mp	−5.1	−12.4	−9.6	−5.1
		TOTAL ORGANICS	190.39	164.97			9.2%	13.5%	−0.4%	2.2%
		TOTAL INORGANICS	356.15	335.38			9.4%	4.7%	−1.4%	1.1%
		GRAND TOTAL	546.54	500.35			9.2%	7.4%	−1.1%	1.4%

a Revised. b tt = thousands of tons, bcf = billions of cubic feet, mp = millions of pounds, mg = millions of gallons, tmt = thousands of metric tons. c Except refractory dolomite. d Synthetic and natural. e 100% basis. f Original solution. g Liquid and solid only. h Includes both acid and ester without double counting. i 37% by weight. j All grades. k K_2O basis. l Synthetic only. m Rubber grade. n Solid and liquid. o High and low purity. p First year in which qualified for inclusion in Top 50; ethanol has been excluded. nm = not meaningful. Sources: Bureau of the Census, Bureau of Mines, International Trade Commission, C&EN estimates

PRODUCTION: Chemical industry last year lagged manufacturing as a whole

Industrial production indexes, 1967 = 100	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	Annual change 1983–84	Annual change 1974–84
Total index	163.3	147.6	138.6	151.0	147.0	152.5	146.1	138.2	130.5	117.8	129.3	11%	2%
Manufacturing, total	164.8	148.2	137.6	150.4	146.7	153.6	146.8	138.4	130.3	116.3	129.4	11	2
Nondurable manufacturing	179.4	168.1	156.2	164.8	161.2	164.0	156.9	150.5	141.8	126.4	134.6	7	3
Chemicals and products	228.1	215.0	196.1	215.6	207.1	211.8	197.4	185.7	170.9	147.2	159.4	6	4
Chemicals and synthetic materials	241.0	226.2	196.7	228.6	222.2	234.2	216.7	201.1	185.1	154.1	176.7	7	3
Basic chemicals	185.6	175.2	157.1	186.8	187.4	192.0	181.9	171.8	161.8	135.9	153.3	6	2
Alkalies and chlorine	116.9	108.5	99.2	114.7	121.4	132.3	119.7	119.2	119.0	106.5	125.6	8	−1
Gases, coal tar, inorganic pigments	192.0	177.4	160.0	181.5	184.3	197.7	186.0	174.3	164.4	133.3	165.0	8	2
Basic organic chemicals	229.7	220.9	192.9	236.7	231.6	233.3	221.2	204.7	189.8	155.3	177.9	4	3
Inorganic chemicals, nec	125.4	114.4	109.9	125.5	132.4	134.9	129.3	128.5	124.3	112.9	112.6	10	1
Acids and fertilizer materials	135.3	121.2	116.0	137.2	145.9	142.0	133.6	124.2	117.6	108.4	116.6	12	1
Synthetic materials	353.8	330.3	277.4	313.7	293.3	320.1	287.6	260.8	232.5	191.0	224.4	7	5
Plastics materials	539.4	486.0	403.6	429.3	386.5	420.1	366.5	320.3	280.1	213.1	258.5	11	8
Synthetic rubber	122.0	109.2	84.9	103.3	103.2	130.5	127.5	124.5	118.7	101.2	129.7	12	−1
Man-made fibers	234.5	236.2	204.2	254.4	250.3	270.8	250.9	236.8	214.3	191.2	214.4	−1	1
Chemical products	215.3	204.0	195.8	203.0	192.4	190.2	179.0	170.9	157.2	140.7	142.8	6	4
Drugs and medicines	295.0	280.6	266.8	267.1	245.7	238.2	220.6	213.9	191.5	174.1	179.6	5	5
Soap and toiletries	184.6	179.1	171.5	177.0	170.8	171.6	163.8	155.0	143.0	127.7	128.1	3	4
Paints	131.5	118.3	115.3	127.4	130.5	137.8	132.6	125.8	122.8	114.2	119.2	11	1
Agricultural chemicals	217.2	197.3	208.7	241.4	230.5	221.6	211.8	201.1	185.4	163.9	144.6	10	4
Petroleum products	124.4	120.3	121.8	129.7	132.9	143.9	145.2	142.6	133.5	124.1	124.7	3	0
Rubber and plastics products	331.7	291.9	254.7	274.0	255.7	272.2	253.6	232.3	199.7	166.7	195.2	14	5

nec = not elsewhere classified. **Source:** Federal Reserve Board

MINERALS: Production of most fertilizer raw materials still below 10 years ago

Thousands of tons	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	Annual change 1983–84	Annual change 1974–84
Bromine, sold or used[a]	170[b]	185	200	189	189	249	223	217	230	204	216	−8%	−2%
Calcium chloride, production[c,d]	1,049[b]	912	853	917	811	981	1,031	968	897	828	1,101	15	0
Iodine, consumption[e,f]	3.8[b]	4.1	3.4	4.4	4.4	4.4	4.0	4.3	3.6	3.1	3.8	−6	0
Imports[f]	2.8[b]	3.1	2.3	3.0	3.1	3.1	3.4	3.5	3.2	2.7	4.0	−11	−4
Lime, sold or used[g]	16,100[b]	14,867	14,075	18,890	19,037	20,983	20,484	19,987	20,257	19,159	21,645	8	−3
Lithium, consumption[e,h]	2.6	2.2	2.0	3.2	3.0	3.2	3.4	4.1	2.8	2.9	3.8	18	−4
Phosphate rock													
Marketable production	54,230	46,928	41,241	59,110	59,982	56,891	55,156	52,091	49,231	48,806	45,676	16	2
Exports	12,707	13,239	10,849	11,458	15,737	15,827	14,187	14,584	10,398	12,270	13,895	−4	−1
Potash (K_2O equivalent)[i]													
Production	1,764[b]	1,575	1,967	2,377	2,468	2,453	2,484	2,457	2,400	2,501	2,552	12	−4
Imports[j]	5,401[b]	4,894	4,253	5,287	5,481	5,693	5,189	5,076	4,594	3,797	4,325	10	2
Apparent consumption	6,724[b]	6,231	5,647	6,849	6,999	7,626	6,840	6,605	6,149	5,113	6,086	8	1
Salt, total sold or used[k]	37,750[b]	34,573	37,880	38,915	40,396	45,820	42,896	43,439	44,218	41,057	46,565	9	−2
Evaporated[l]	5,285[b]	5,532	5,303	6,209	6,358	6,248	5,872	5,704	5,634	5,372	5,951	−4	−1
Rock[l]	12,835[b]	12,446	12,879	11,871	11,806	14,891	14,688	14,958	15,668	14,283	14,835	3	−1
Salt in brine[l]	19,630[b]	16,595	19,698	20,835	22,231	24,681	22,336	22,777	22,917	21,401	25,779	18	−3
Sodium carbonate, production[d]	8,350[b]	8,467	7,819	8,281	8,275	8,253	8,290	8,040	7,560	7,130	7,566	−1	1
Sulfur, production[m]	11,742	10,240	10,788	13,388	13,080	13,339	12,318	11,824	11,992	12,610	12,789	15	−1
Apparent consumption[n]	13,976	12,112	11,088	14,093	15,056	15,145	13,889	12,850	12,060	11,875	12,115	15	1
Frasch, production	4,622	3,530	4,641	6,997	7,044	7,007	6,226	6,520	7,016	8,077	8,849	31	−6
Recovered elemental, production	5,747	5,462	4,855	4,695	4,490	4,486	4,478	3,995	3,514	3,326	2,948	5	7
Other, production	1,372	1,249	1,293	1,695	1,547	1,845	1,615	1,310	1,462	1,208	992	10	3

a Elemental bromine sold as such or used in preparation of bromine compounds by primary producers. b Preliminary figure. c 75% $CaCl_2$ equivalent. d Natural and synthetic. e Estimated apparent consumption. f Crude elemental iodine. g Includes Puerto Rican production. h Lithium content basis. i Includes muriate and sulfate of potash, potassium magnesium sulfate, and parent salts; excludes other chemical compounds containing potassium. j Includes nitrate of potash. k Total obtained by all recovery methods that was sold or used by domestic producers (figures differ slightly from U.S. production figures); figures for 1973–81 include Puerto Rican production. l Sold or used as such. m Sulfur content basis. n Calculated from shipments plus imports minus exports (sulfur content basis). **Source:** Bureau of Mines

ORGANIC CHEMICALS: Growth in output during past decade has been moderate at best

Millions of lb unless otherwise noted	Production											Annual change	
	1984[a]	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1983–84	1974–84
Acetic acid, synthetic	2,642	2,807	2,748	2,705	2,977	3,265	2,776	2,570	2,463	2,197	2,584	−6%	0%
Acetone	1,887	1,859	1,694	2,144	2,076	2,653	2,519	2,219	1,869	1,640	1,980	2	0
Acrylonitrile	2,201	2,146	2,035	1,997	1,830	2,018	1,752	1,646	1,518	1,215	1,412	3	5
Aniline	786	663	557	634	659	690	608	584	544	407	551	19	4
Benzene, mg[b,c]	1,339	1,232	1,052	1,308	1,534	1,612	1,435	1,371	1,365	959	1,406	9	0
Bisphenol A	762	643	480	555	530	576	471	455	449	293	370	19	7
1,3-Butadiene[d]	2,531	2,353	1,915	2,986	2,799	3,583	3,515	3,259	3,507	2,597	3,682	8	−4
1-Butanol	918	833	730	809	790	766	756	660	625	490	558	10	5
Caprolactam	1,027	977	793	928	905[e]	945	919	867	780	713	668	5	4
Carbon tetrachloride	712	573	587	726	710	714	737	809	857	906	1,163	24	−5
Chloroform	393	362	299	405	273	356	349	302	292	262	302	9	3
Cumene	3,360	3,345	2,743	3,309	3,459	3,917	3,380	2,644	2,716	2,003	2,906	0	1
Cyclohexane	2,130	1,656	1,275	1,620	1,964	2,425	2,332	2,265	2,187	1,734	2,352	29	−1
Dioctyl phthalate	292	300	266	304	353	336	409	400	413	312	395	−3	−3
Dodecylbenzene[f]	na	545	509	535	563[e]	627	526	526	529	495	533	na	na
Ethanol, synthetic	1,108	1,077	1,023	1,317	1,451	1,408	1,267	1,339	1,496	1,429	1,618	3	−4
Ethanolamines[g]	514	468	416	429	376	420	362	308	286	258	307	10	5
Ethylbenzene	8,613	7,876	6,656	7,813	7,642	8,448	8,385	8,312	5,770	4,822	6,048	9	4
Ethyl chloride	292	282	339	324	396	582	540	612	669	575	662	4	−8
Ethylene	31,178	28,680	24,501	29,418	28,667	29,904	25,955	25,172	22,475	20,499	23,891	9	3
Ethylene dichloride	13,731	11,506	7,619	9,974	11,108	11,794	11,001	10,997	8,042	7,977	9,165[h]	19	4
Ethylene glycol	4,842	4,425	4,309	4,143	4,386	4,729	3,904	3,675	3,335	3,809	3,341	9	4
Ethylene oxide	5,957	5,534	4,987	4,937	5,220	5,665	5,012	4,364	4,184	4,467	4,200[i]	8	4
2-Ethylhexanol	512	387	325	389	367	318	420	493	450	387	395	32	3
Formaldehyde, 37%[j]	5,712	5,465	4,817	5,721	5,555	5,971	6,361	6,046	5,449	4,558	5,764	5	0
Isopropyl alcohol	1,147	1,209	1,380	1,669	1,836	1,900	1,730	1,868	1,936	1,521	1,939	−5	−5
Maleic anhydride	361	299	260	293	304	323	341	294	264	216	290	21	2
Methanol, synthetic	8,280	7,982	7,555	8,577	7,153	7,367	6,443	6,453	6,242	5,176	6,878	4	2
Methyl chloride	384	409	366	405	362	463	454	476	378	366	493[h]	−6	−5
Methylchloroform	668	586	595	614	692	716	644	635	631	459	592	14	1
Methylene chloride	551	584	532	592	564	633	570	478	538	497	609	−6	−1
Methyl ethyl ketone	556	531	468	611	587	656	661	512	428	425	506	5	1
Methyl methacrylate	906	844	721	891	780	931	na	745	na	546	719	7	2
Perchloroethylene	509	547	585	691	765	773	725	614	669	679	734	−7	−4
Phenol, synthetic[k]	2,845	2,638	2,023	2,578	2,568	2,981	2,682	2,338	2,121	1,746	2,298	8	2
Phthalic anhydride	869	838	684	870	818	1,013	978	926	902	702	977	4	−1
Propylene[l]	15,470	13,959	12,535	13,482	13,676	14,198	13,014	13,328	10,030	8,709	10,475[m]	11	4
Propylene glycol	487	484	400	473	488	610	547	489	517	391	510	1	−0
Styrene, monomer	7,706	6,802	5,942	6,679	6,856	7,484	7,186	6,867	6,301	4,673	5,956	13	3
Terephthalic acid, dimethyl ester[n]	6,047	5,626	4,843	6,235	6,054	6,159	5,954	5,410	5,051	4,614	4,262	7	4
Toluene, mg[b,o]	726	780	714	852	1,010	1,001	1,046	1,008	990	695	908	−7	−2
Vinyl acetate	2,023	1,963	1,876	1,936	1,922	1,982	1,692	1,586	1,491	1,290	1,403	3	4
Vinyl chloride	7,513	6,875	4,902	6,874	6,466	6,389	6,941	5,986	5,677	4,196	5,621	9	3
***o*-Xylene**	696	781	802	918	995	1,082	1,013	985	854	703	1,056	−11	−4
***p*-Xylene**	4,268	4,114	3,391	4,532	4,238	4,650	3,516	3,172	2,911	2,484	2,707	4	5

a Preliminary. **b** Tar distillers and coke-oven operators not included. **c** Specification grades. **d** Rubber grade. **e** Preliminary figure, final figure not available. **f** Includes straight-chain dodecylbenzene, tridecylbenzene, and other straight-chain alkylbenzenes. **g** Mono-, di-, and triethanolamines. **h** Production figure may be too low because some ethylene dichloride and methyl chloride were produced but not separated or measured accurately by some producers. **i** Approximate. **j** By weight. **k** Does not include data for coke ovens and gas-retort ovens. **l** All grades. **m** Includes data for propane-propylene mixture. **n** Includes both acid and dimethyl ester (DMT), without double counting. **o** High-purity toluene, includes material used in blending motor fuel. **mg** = millions of gallons. **na** = not available. **Source:** International Trade Commission

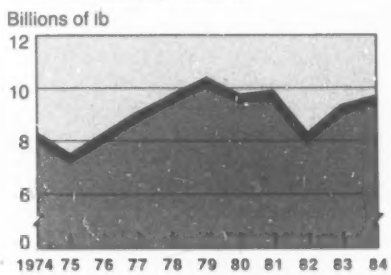
INORGANICS: Output of most chemicals up again in 1984 from 1982 trough

Thousands of tons unless otherwise noted	Production											Annual change	
	1984[a]	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1983–84	1974–84
Aluminum sulfate[b]	1,079	1,144	1,154	1,294	1,286	1,315	1,309	1,255	1,202	1,146	1,257	−6%	−2%
Ammonia,[c,d] 100%	16,204	14,072	15,801	19,044	19,653	18,634	17,119	17,765	16,716	16,419	15,733	15	0
Ammonium nitrate,[e] 100%	7,005	6,240	7,091	8,861	9,128	8,293	7,210	7,177	7,186	7,088	7,542	12	−1
Ammonium sulfate,[d,f] 100%	2,063	1,956	1,768	2,185	2,136	2,363	2,449	2,264	2,010	2,106	2,120	5	0
Chlorine gas[g]	10,724	9,960	9,176	10,763	11,421	12,291	11,052	10,573	10,378	9,167	10,753	8	0
Hydrochloric acid,[h] 100%	2,862	2,608	2,450	2,574	2,888	3,090	2,793	2,668	2,542	2,009	2,470	10	1
Hydrogen,[i,j] bcf, 100%	109	100	89	105	107	106	90	85	82	74	82	9	3
Nitric acid,[k] 100%	8,041	6,768	7,390	9,093	9,231	8,916	7,934	7,987	7,791	7,527	8,120	19	0
Nitrogen gas,[i,l] bcf, 100%	601	560	483	490	479	427	379	328	289	252	243	7	9
Oxygen,[i,l] bcf, 100%	375	343	349	431	431	456	430	392	388	353	390	9	0
Phosphoric acid, 100% P_2O_5	11,111	9,767	8,253	9,958	10,848	10,318	9,637	8,745	7,949	7,677	7,213	14	4
Phosphorus[m]	384	366	361	426	432	460	441	430	437	450	524	5	−3
Sodium chlorate, 100%	245	310	291	297	312	269	265	251	199	173	203	−21	2
Sodium hydroxide, 100%	11,224	10,230	9,385	10,621	11,625	12,759	11,309	11,000	10,516	9,635	11,189	10	0
Sodium phosphate[n]	673	669	651	696	727	757	739	717	724	770	903	1	−3
Sodium silicate[o]	750	728	664	771	805	813	829	760	747	724	770	3	0
Sodium sulfate,[p] 100%	872	914	864	1,111	1,140	1,121	1,174	1,199	1,232	1,227	1,348	−5	−4
Sulfuric acid,[q] 100%	39,638	36,583	33,233	40,742	44,158	43,204	41,314	38,337	34,878	32,360	33,936	8	2
Titanium dioxide,[r] 100%	799	757	660	761	727	742	701	687	713	603	787	6	0
Urea	7,148	6,137	6,470	8,062	7,830	7,000	6,273	5,072	4,498	3,799	3,789	16	7

a Preliminary. b Commercial, 17% Al_2O_3; includes municipalities. c Synthetic anhydrous. d Excludes by-product ammonia liquor and ammonium sulfate. e Original solution. f Synthetic and noncoke by-product. g Includes quantities liquefied for use, storage, or shipment. h Includes anhydrous hydrochloric acid production. i High- and low-purity gas. j Liquid and gas; excludes amounts vented and used as fuel, and amounts produced in petroleum refineries for captive use. k Includes unspecified amounts of nitric acid produced but not withdrawn from the system. l Excludes amounts produced and consumed in making synthetic ammonia or ammonia derivatives. m Elemental, white (yellow), and red. n Tripolyphosphate (100% $Na_5P_3O_{10}$). o Soluble silicate glass (water glass), solid and liquid (anhydrous); excludes amounts produced and consumed in making meta-, ortho-, and sesquisilicates. p Anhydrous, high and low purity, and Glauber's salt. q Gross (new and fortified). r Composite and pure. **Note:** bcf = billions of cubic feet. **Sources:** Department of Commerce, International Trade Commission

MAN-MADE FIBERS: Production edged higher last year

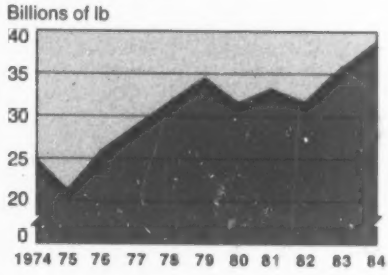
Man-made fibers production



Millions of lb	Production											Annual change	
	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1983–84	1974–84
CELLULOSIC FIBERS													
Acetate[a]	199	229	196	261	316	324	308	290	298	313	382	−13%	−6%
Rayon	421	401	388	509	490	606	597	598	543	436	817	5	−6
NONCELLULOSIC FIBERS													
Acrylic[b]	671	671	624	691	779	761	726	709	621	525	631	0	1
Nylon	2412[c]	2419[c]	1927[d]	2332[d]	2358[d]	2,720[d]	2550[d]	2326[d]	2075[d]	1857[d]	2124[d]	0	1
Olefins[e]	997	906	723	785	748	759	692	635	577	497	531	10	7
Polyester	3392	3544	3169	4176	3989	4,178	3800	3642	3340	2995	2926	−4	1
Textile glass	1394	1168	893	1041	867	1,014	923	787	676	546	683	19	7
TOTAL	**9486**	**9336**	**7926**	**9795**	**9547**	**10,362**	**9596**	**8987**	**8130**	**7169**	**8094**	**2%**	**2%**

a Includes diacetate and triacetate; excludes production for cigarette filters. b Includes modacrylic. c Excludes aramid. d Includes aramid. e Includes olefin yarn and monofilaments and olefin and vinyon staple and tow. **Note:** Totals may not add because of rounding. **Source:** Textile Economics Bureau

Plastics production



PLASTICS: Output hit a new high for the second year in a row

Millions of lb[a]	Production											Annual change	
	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1983–84	1974–84
THERMOSETTING RESINS													
Epoxy[b]	406	334	286	336	315	361	299	261	244	198	249	22%	5%
Polyester[c]	1,232	1,084	865	997	947	1,147	1,209	1,061	1,042	834	911	14	3
Urea	1,199	1,172	998	1,165	1,165	1,367	1,122	963	821	690	835	2	4
Melamine	210	180	158	179	167	200	202	200	186	115	164	17	3
Phenolic[d]	2,502[e]	2,477[e]	2,006[e]	2,333[e]	1,499	1,781	1,617	1,458	1,340	1,051	1,335	1	nc
TOTAL	**5,549**	**5,247**	**4,313**	**5,010**	**4,093**	**4,856**	**4,449**	**3,943**	**3,633**	**2,888**	**3,494**	**6%**	**nc**
THERMOPLASTIC RESINS													
Polyethylene													
Low density[f]	8,413	8,041	7,503	7,693	7,291	7,793	7,111	6,471	5,813	4,743	5,973	5	3
High density[g]	6,085	5,689	4,928	4,695	4,405	5,010	4,201	3,652	3,125	2,468	2,837	7	8
Polypropylene	4,940	4,433	3,477	3,955	3,648	3,841	3,074	2,747	2,632	1,902	2,249	11	8
Styrene-acrylonitrile	99	93	91	107	111	124	120	115	113	109	109	6	−1
Polystyrene	3,838	3,570	3,191	3,621	3,521	4,005	3,823	3,446	3,195	2,662	3,364	8	1
Styrene-butadiene copolymers, acrylonitrile-butadiene-styrene, and other styrene polymers	2,127	1,889	1,380	1,745	1,705	2,107	2,012	1,882	1,744	1,227	1,536	13	3
Polyamide, nylon type	396	321	228	312	274	327	275	254	247	135	204	23	7
Polyvinyl chloride and copolymers	6,760	6,067	5,326	5,707	5,470	6,119	5,723	5,253	4,716	3,648	4,850	11	3
Other vinyl resins[h]	187	186	177	208	196	220	197	197	225	187	209	1	−1
TOTAL	**32,845**	**30,289**	**26,301**	**28,043**	**26,621**	**29,546**	**26,536**	**24,017**	**21,810**	**17,081**	**21,331**	**15%**	**4%**

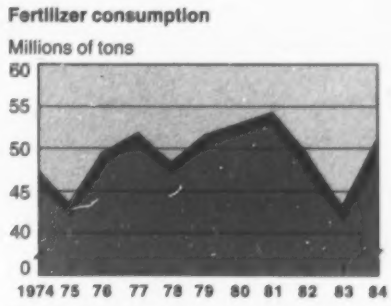
a Dry-weight basis, unless otherwise specified. b Unmodified. c Unsaturated. d Includes other tar acid resins. e Gross-weight basis. f 0.940 density and below. g Density above 0.940. h Includes polyvinyl butyral, polyvinyl formal, and polyvinylidene chloride. nc = not comparable. **Source:** Society of the Plastics Industry

SYNTHETIC RUBBER: Volume rose in all categories in 1984

Thousands of metric tons	Production											Annual change	
	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1983–84	1974–84
Styrene-butadiene rubber[a]	958	904	876	1032	1074	1378	1395	1395	1333	1179	1466	6%	−4%
Polybutadiene	359	333	288	342	311	397	378	361	352	290	310	8	1
Nitrile	67	55	45	66	63	75	73	70	73	55	88	22	−3
Ethylene-propylene	215	175	123	178	144	175	174	158	130	84	126	23	5
Polychloroprene	130	115	119	143	151	183	161	165	165	144	163	13	−2
Other[b]	365[c]	353[c]	379[c]	261	272	326	292	267	250	188	345	3	1
TOTAL	**2094**	**1935**	**1830**	**2022**	**2015**	**2534**	**2473**	**2416**	**2303**	**1940**	**2498**	**8%**	**−2%**

a Excludes high-styrene latex (more than 45% styrene). b Includes butyl, polyisoprene, silicone, and other synthetic elastomers. Excludes polyurethane rubber. c Values are partly estimated. **Source:** Rubber Manufacturers Association

FERTILIZERS: U.S. production rose for phosphates and nitrogen but not potash



Note: Years ending June 30.
Source: Department of Agriculture

Thousands of tons	Production											Annual change	
	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1983–84	1974–84
NITROGEN (N)													
Domestic production	10,364	9,855	11,598	13,036	12,323	11,106	10,466	10,789	10,572	9343	10,094	5%	0%
Imports	3,940	2,654	2,531	2,455	2,566	2,165	1,866	1,842	1,218	1198	1,068	48	14
Exports	2,080	2,074	2,499	3,088	2,641	2,468	1,778	1,251	1,239	1115	1,269	0	5
Domestic supply	12,224	10,435	11,630	12,403	12,248	10,803	10,554	11,380	10,551	9426	9,893	17	2
PHOSPHATE (P_2O_5)													
Domestic production	9,611	8,043	7,818	10,471	10,012	9,432	8,245	7,793	7,199	7230	6,869	19	3
Imports	121	133	193	250	239	236	229	245	221	274	315	−9	−9
Exports	4,352	3,916	3,751	4,381	3,925	3,848	3,290	2,501	2,175	1860	1,581	11	11
Domestic supply	5,380	4,260	4,260	6,340	6,326	5,820	5,184	5,537	5,245	5644	5,603	26	0
POTASH (K_2O)													
Domestic production	1,653	1,859	1,831	2,262	2,474	2,519	2,176	2,584	2,313	2287	2,604	−11	−4
Imports	5,164	4,402	4,797	5,487	5,403	5,085	4,948	4,955	3,910	3847	4,114	17	2
Exports	528	624	641	876	1,048	999	1,003	994	911	848	947	−15	−6
Domestic supply	6,289	5,637	5,987	6,873	6,829	6,605	6,121	6,545	5,312	5286	5,771	12	1

Note: Years ending June 30. **Source:** Department of Agriculture

After two poor years, U.S. fertilizer use increased 20% last year

Millions of tons	Consumption											Annual change	
	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1983–84	1974–84
TYPE													
Mixed fertilizer[a]	21.2	18.4	20.9	23.5	23.3	23.7	22.1	24.1	23.0	20.6	24.1	15%	−1%
Primary nutrient material[b]	29.0	23.5	27.8	30.5	29.5	27.7	25.4	27.5	26.2	21.8	23.0	23	2
TOTAL	**50.2**	**41.9**	**48.7**	**54.0**	**52.8**	**51.4**	**47.5**	**51.6**	**49.2**	**42.4**	**47.1**	**20%**	**1%**
PRIMARY NUTRIENT CONTENT													
Nitrogen (N)	11.0	9.1	11.0	11.9	11.4	10.7	10.0	10.6	10.4	8.6	9.2	22	2
Phosphate (P_2O_5)	4.9	4.1	4.8	5.4	5.4	5.6	5.1	5.6	5.2	4.5	5.1	19	0
Potash (K_2O)	5.8	4.8	5.6	6.3	6.2	6.2	5.5	5.8	5.2	4.5	5.1	20	1
TOTAL	**21.9**	**18.1**	**21.4**	**23.7**	**23.1**	**22.6**	**20.6**	**22.1**	**20.9**	**17.6**	**19.3**	**21%**	**1%**

a Fertilizer materials that contain more than one primary nutrient. b Fertilizer materials that contain one primary nutrient. **Note:** Years ending June 30. **Source:** Department of Agriculture

NITROGEN OUTPUT: Up, but still below 1982

Thousands of tons (N)	1984	1983	1982	1974	Change 1983–84
Ammonia[a]	4,179	3587	5,032	4,370	17%
Ammonium nitrate[b,c]	913	943	1,105	1,317	−3
Urea	1,786	1692	1,684	586	6
Ammonium sulfate[c]	517	395	432	502	31
All other	2,969	3238	3,345	3,306	−8
TOTAL	**10,364**	**9855**	**11,598**	**10,141**	**5%**

a Includes aqueous solutions. b Includes ammonium nitrate-limestone mixtures. c Adjusted for estimated quantity going into nonfertilizer uses. **Note:** Years ending June 30. **Source:** Department of Agriculture

PHOSPHATE OUTPUT: Another strong year

Thousands of tons (P_2O_5)	1984	1983	1982	1974	Change 1983–84
Ammonium phosphate[a]	6156	5026	4434	2664	22%
Concentrated superphosphate	1172	1184	1151	1714	−1
Normal and enriched superphosphate	113	110	153	673	3
All other	2170	1723	2080	1539	26
TOTAL	**9611**	**8043**	**7818**	**6590**	**19%**

a Liquid and solid, excluding that combined with potash salts in process of manufacture. **Note:** Years ending June 30. **Source:** Department of Agriculture

ENERGY USE BY CHEMICAL INDUSTRY: Natural gas's share continues to decline

Energy source[a]	1984 Trillion Btu	1984 % of total	1983 Trillion Btu	1983 % of total	1982 Trillion Btu	1982 % of total	1981 Trillion Btu	1981 % of total	1972 Trillion Btu	1972 % of total	Change 1972–84 Trillion Btu	Change 1972–84 %
Natural gas	1005	36.5%	1010	37.6%	1051	38.7%	1272	40.2%	1537	47.4%	−532	−34.6%
Purchased electricity[b]	819	29.8	814	30.3	811	29.9	931	29.4	729	22.5	90	12.3
Petroleum-based fuels	541	19.7	458	17.1	472	17.4	542	17.1	564	17.4	−23	−4.0
Light hydrocarbons[c]	330	12.0	308	11.4	325	12.0	351	11.1	309	9.5	22	7.0
Residual fuels	65	2.4	91	3.4	88	3.2	104	3.3	162	5.0	−97	−60.0
Distillate fuels	13	0.5	12	0.4	14	0.5	18	0.6	34	1.0	−21	−61.6
Other fuel[d]	133	4.8	48	1.8	45	1.7	70	2.2	59	1.8	74	123.9
Coal and coke	295	10.7	320	11.9	295	10.9	324	10.2	282	8.7	13	4.8
Purchased steam	91	3.3	85	3.2	83	3.1	98	3.1	128	4.0	−37	−28.7
TOTAL	2752	100.0%	2688	100.1%	2712	100.0%	3167	100.0%	3240	100.0%	−488	−15.1%

a For energy and process use only, excluding energy equivalent of feedstock. b Electricity is calculated as fuel value of 10,000 Btu to generate 1 kWh instead of using standard conversion factor of 3412 Btu per kWh. c Includes propane, liquefied petroleum gas, and other gases. d Includes petroleum coke, gasoline, and other liquids and solids. **Note:** Data from companies accounting for about 90% of U.S. capacity for basic industrial chemicals. **Source:** Chemical Manufacturers Association

ENERGY USE BY FERTILIZER INDUSTRY: Total rises sharply but is still below earlier peak

Energy source[a]	1984 Trillion Btu	1984 % of total	1983 Trillion Btu	1983 % of total	1982 Trillion Btu	1982 % of total	1981 Trillion Btu	1981 % of total	1972 Trillion Btu	1972 % of total	Change[b] 1972–84 Trillion Btu	Change[b] 1972–84 %
Natural gas	160.0	78.3%	125.6	77.6%	151.8	76.8%	200.6	81.2%	161.3	79.3%	−1.3	−0.8%
Purchased electricity[c]	38.7	18.9	31.9	19.7	33.7	17.1	43.7	17.7	35.3	17.4	3.4	9.7
Petroleum-based fuels	2.8	1.4	0.4	0.3	4.4	2.3	1.8	0.7	6.2	3.1	−3.5	−55.4
Residual fuels	2.2	1.1	0.4	0.2	4.4	2.2	1.0	0.4	3.8	1.9	−1.7	−43.3
Distillate fuels	na	na	na	na	na	na	0.7	0.3	2.2	1.1	na	na
Other fuel[d]	0.6	0.3	0.1	0.1	0	0	0.2	0.1	0.2	0.1	0.4	244.5
Coal and coke	na	na	na	na	na	na	0.5	0.2	0.5	0.2	na	na
Generated steam[e]	2.8	1.4	3.9	2.4	7.6	3.8	na	na	na	na	na	na
Purchased steam	0	0	0	0	0	0	0.4	0.1	0.1	0	−0.1	100
TOTAL	204.3	100.0%	161.8	100.0%	197.6	100.0%	246.9	99.9%	203.3	100.0%	0.9	0.5%

a For energy and process use only, excluding energy equivalent of feedstock. b Data for 1984 cover 21 firms, but one firm is not included in 1972 base owing to unavailability of data because of corporate realignment. c Electricity is calculated as fuel value of 10,000 Btu to generate 1 kWh instead of using standard conversion factor of 3412 Btu per kWh. d Includes propane, liquefied petroleum gas, gasoline, diesel oil, kerosine, and other fuels. e Steam generated from fossil fuel, listed prior to 1982 under residual fuels, distillate fuels, other fuel, and coal and coke. na = not available. **Note:** Data from companies accounting for more than 70% of U.S. ammonia capacity. **Source:** Fertilizer Institute

ENERGY USE BY PETROLEUM INDUSTRY: Little change last year

Energy source[a]	1984 Trillion Btu	1984 % of total	1983 Trillion Btu	1983 % of total	1982 Trillion Btu	1982 % of total	1981 Trillion Btu	1981 % of total	1972 Trillion Btu	1972 % of total	Change 1972–84 Trillion Btu	Change 1972–84 %
Natural gas	589	23.0%	565	22.3%	591	22.4%	686	24.7%	970	33.7%	−381	−39.3%
Purchased electricity[b]	246	9.6	244	9.6	242	9.1	250	9.0	190	6.6	56	29.3
Petroleum-based fuels	1695	66.2	1696	66.9	1781	67.5	1810	65.1	1678	58.3	17	1.0
Light hydrocarbons[c]	1123	43.8	1118	44.1	1189	45.0	1194	43.0	996	34.6	126	12.7
Residual fuels	125	4.9	134	5.3	149	5.6	177	6.4	243	8.5	−119	−48.7
Petroleum coke	436	17.1	433	17.1	429	16.2	428	15.4	417	14.5	22	5.2
Other fuel[d]	9	0.3	11	0.4	15	0.5	11	0.4	21	0.7	−12	−58.0
Coal and coke	6	0.2	7	0.3	6	0.2	5	0.2	5	0.2	1	15.7
Purchased steam	25	1.0	23	0.9	20	0.8	28	1.0	35	1.2	−10	−28.3
TOTAL	2561	100.0%	2534	100.0%	2640	100.0%	2779	100.0%	2878	100.0%	−318	−11.0

a For energy and process use only, excluding energy equivalent of feedstock. b Electricity is calculated as fuel value of 10,000 Btu to generate 1 kWh instead of using standard conversion factor of 3412 Btu per kWh. c Includes propane, liquefied petroleum gas, and refinery gas. d Includes distillate fuels, gasoline, and other liquids. **Note:** Data from companies accounting for about 85% of U.S. petroleum refining capacity, including Puerto Rico. **Source:** American Petroleum Institute

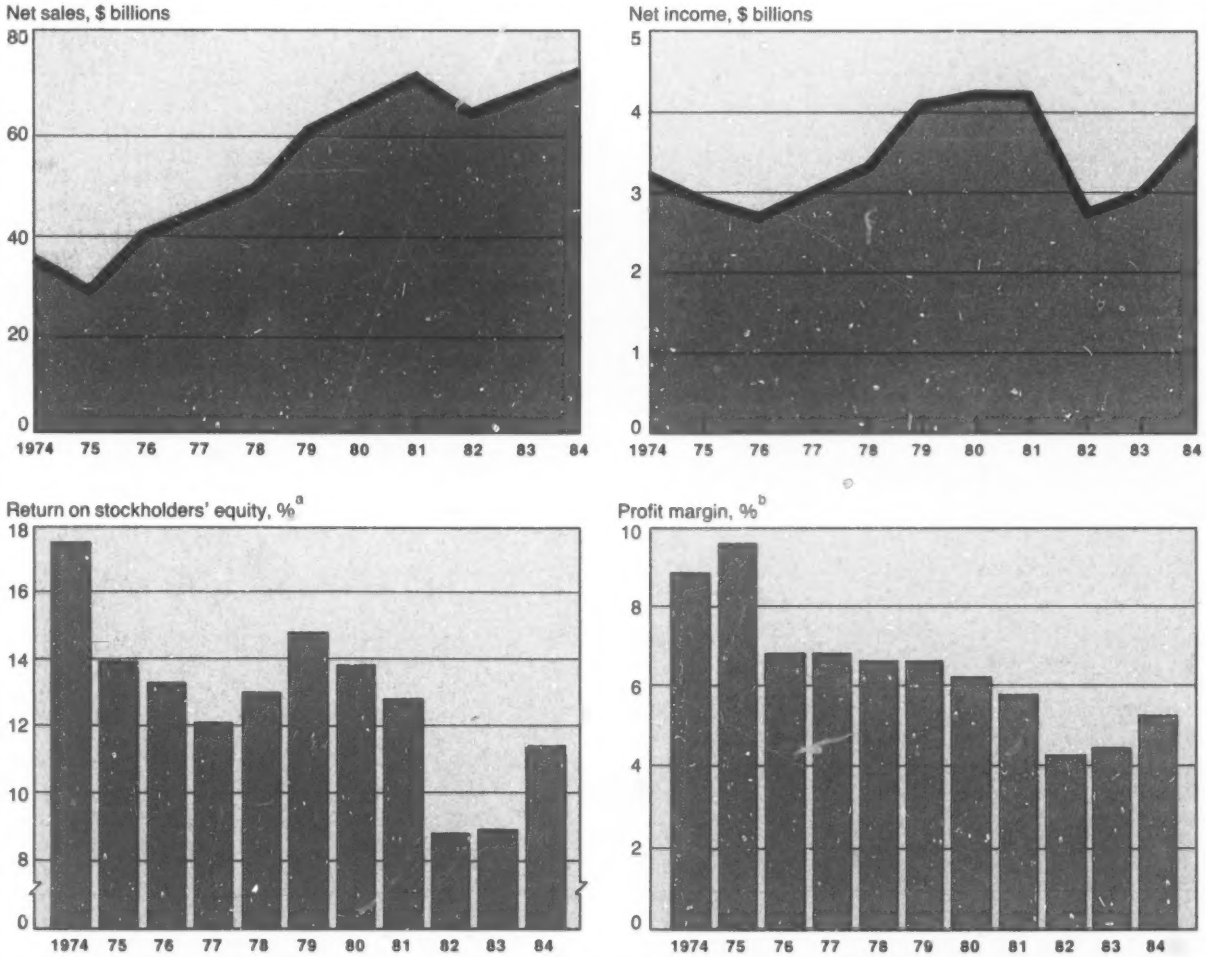
Sales, earnings, profitability up in 1984

Compared with the previous couple of years, 1984 was a good year for the chemical industry. Combined sales for C&EN's 30-company sample increased 7% to $73.4 billion, following a 6% increase in 1983. Earnings last year were up 27% to $3.8 billion, after an 11% increase the year before.

The result was that in 1984, chemical company profitability was up well above that in 1983 and 1982. Profit margins (earnings as a percentage of sales) for the 30 companies averaged 5.2%, compared with 4.4% in 1983. Average return on equity (earnings as a percentage of year's end stockholders' equity) climbed to 11.4% in 1984 from 8.9% the year before.

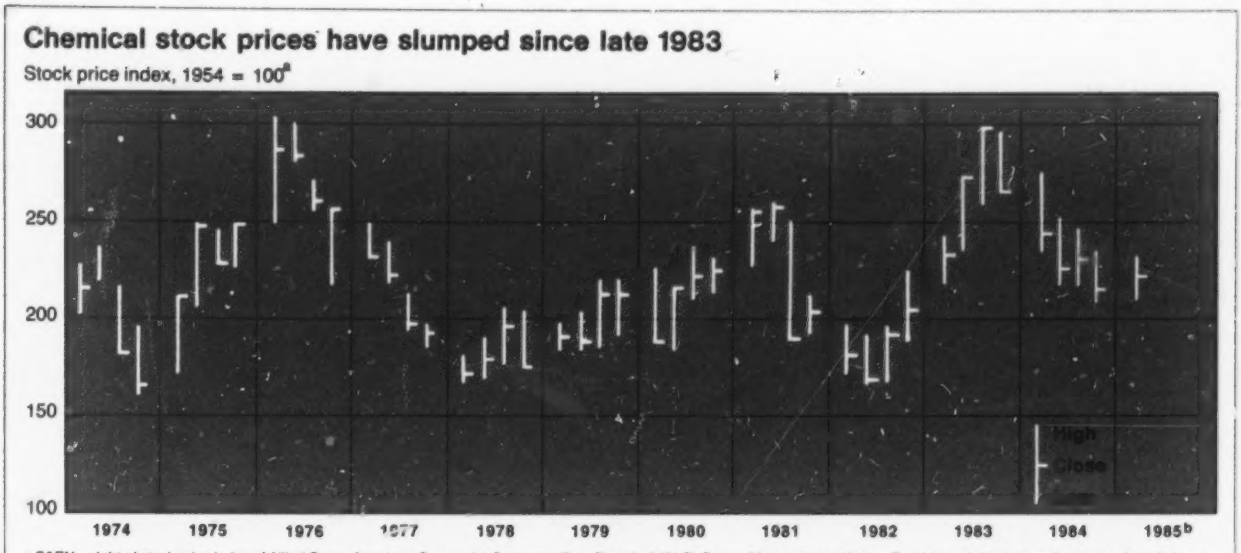
However, despite the good performance last year, the chemical industry still has a long way to go to recover its former luster. Although sales for the 30 companies climbed above their earlier high of $72.2 billion reached in 1979, earnings still are considerably below their previous record of $4.2 billion set in 1980 and 1981. And profitability, although up well in 1984 from the year before, still is nowhere near the levels reached in the late 1970s.

Chemical companies' sales set a record in 1984, but earnings were below their earlier high and profitability remained under previous levels



a After-tax earnings as a percentage of year-end stockholders' equity. b After-tax earnings as a percentage of sales. **Note:** Data based on annual figures for 30 major chemical companies.

Chemical stock prices have slumped since late 1983



a C&EN weighted stock price index of Allied Corp., American Cyanamid, Celanese, Dow Chemical, W. R. Grace, Monsanto, and Union Carbide; weighted according to number of shares outstanding for each company. b First quarter.

SHIPMENTS: A second year of healthy growth for chemical industry sales

$ Billions	1984[a]	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	Annual change 1983–84	Annual change 1974–84
All manufacturing industries	$2273.3	$2047.4	$1910.1	$1994.6	$1851.0	$1727.2	$1523.4	$1358.4	$1185.6	$1039.1	$1017.5	11%	8%
Chemicals and allied products	211.3	190.2	172.8	175.1	161.6	147.7	129.8	118.2	104.1	89.7	83.7	11	10
Industrial chemicals[b]	68.7	59.1	55.8	60.7	56.4	52.3	44.8	41.5	35.6	29.4	26.6	16	10
Drugs, soap, and toiletries	53.6	50.4	48.6	44.1	41.9	36.7	34.7	30.6	27.8	24.3	22.2	6	9
Petroleum and coal products	197.9	191.6	206.4	220.3	198.7	148.4	103.9	97.5	82.3	69.5	58.9	3	13
Rubber and plastic products, nec	52.2	50.3	50.2	46.5	47.3	46.8	43.2	39.6	31.8	27.2	27.9	4	6
Paper and allied products	95.9	85.1	79.0	79.5	72.6	65.2	57.0	52.1	48.2	41.7	41.8	13	9

a Preliminary. b Excluding pigments. nec = not elsewhere classified. **Source:** Department of Commerce

PRICES: Only small increases in most of chemical industry

Producer price indexes,[a] 1967 = 100	Annual average 1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	Annual change 1983–84	Annual change 1974–84
All commodities	310.3	303.1	299.3	293.4	268.8	235.6	209.3	194.2	183.0	174.9	160.1	2%	7%
Industrial commodities	322.6	315.8	312.3	304.1	274.8	236.5	209.4	195.1	182.4	171.5	153.8	2	8
Chemicals and allied products	300.9	292.9	292.4	287.6	260.3	222.3	198.8	192.8	187.2	181.3	146.8	3	7
Industrial chemicals	341.4	342.9	353.0	363.3	324.0	264.0	225.6	223.9	219.3	206.9	151.7	0	8
Prepared paint	272.5	264.7	262.9	249.8	235.3	204.4	192.3	182.4	174.4	166.9	145.7	3	6
Paint materials	329.5	305.6	304.6	300.1	273.9	241.2	212.7	205.9	189.8	177.2	152.3	8	8
Drugs and pharmaceuticals	240.4	226.2	210.1	193.5	174.5	159.4	148.1	140.5	134.0	126.6	112.7	6	8
Fats and oils, inedible	371.3	283.7	267.1	295.6	298.0	376.7	315.8	279.0	249.9	255.2	338.2	31	1
Agricultural chemicals and chemical products	284.7	280.7	292.7	285.0	257.1	214.4	198.4	187.8	188.4	203.6	137.7	1	8
Plastic resins and materials	308.6	290.2	283.3	289.2	279.2	235.9	199.8	195.7	194.0	180.9	143.8	6	8
Other chemicals and allied products	277.3	273.7	269.8	254.2	224.5	191.8	181.8	175.7	170.7	168.6	147.5	1	7
Rubber and plastics products	247.2	243.4	241.6	232.6	217.4	194.3	174.8	167.6	159.2	150.2	136.2	2	6

a Formerly called "wholesale price indexes." **Source:** Department of Labor

TOP 100 CHEMICAL PRODUCERS: Only a third get more than 75% of their total sales volume from

Rank 1984[a]	Rank 1983	Company	Chemical sales 1984 ($ millions)	Change from 1983	Chemical sales as % of total sales	Industry classification	Chemical operating profits[b] ($ millions)	Change from 1983	Chemical operating profits as % of total operating profits[b]	Operating profit margin[c]	Identifiable chemical assets ($ millions)	Chemical assets as % of total assets	Operating return on chemical assets[d]
1	1	Du Pont	$12,005	3.4%	33.4%	Diversified	$1107	−3.2%	25.4%	9.2%	$7538	34.3%	14.7%
2	2	Dow Chemical	9,591	8.1	84.0	Basic chemicals	741	29.3	87.4	7.7	7645	66.9	9.7
3	3	Exxon	6,870	7.5	7.2	Petroleum	677	80.1	6.5	9.9	5246	8.3	12.9
4	4	Monsanto	5,951[e]	7.6	88.9	Basic chemicals	669	35.7	98.8	11.2	5054	79.3	13.2
5	5	Union Carbide	4,158	6.3	43.7	Basic chemicals	480	74.5	49.3	11.5	4683	46.4	10.2
6	7	Shell Oil	3,383	4.8	16.3	Petroleum	273	110.0	8.5	8.1	3624	15.3	7.5
7	6	Celanese	3,328	2.1	100.0	Basic chemicals	272	27.1	100.0	8.2	3104	100.0	8.8
8	10	Atlantic Richfield	3,144	23.3	12.8	Petroleum	148	131.3	3.9	4.7	2616	11.8	5.7
9	9	W. R. Grace	2,848	3.2	42.3	Specialty chemicals	336	3.7	57.7	11.8	1779	36.3	18.9
10	8	Amoco Corp.	2,834	−2.5	9.7	Petroleum	349	101.7	8.2	12.3	2249	9.6	15.5
11	12	Mobil	2,607	11.8	4.3	Petroleum	56	def	1.1	2.1	2253	5.7	2.5
12	13	Eastman Kodak	2,464	7.8	22.7	Photo equipment	281	31.3	18.2	11.4	2054	19.1	13.7
13	11	Allied	2,433	4.1	22.7	Diversified	231	3.1	17.2	9.5	1345	16.4	17.2
14	14	Phillips Petroleum	2,351	4.3	15.1	Petroleum	221	166.3	8.9	9.4	1498	8.8	14.8
15	—	General Electric	2,117	7.8	7.3	Electrical products	470	42.9	12.1	22.2	2362	9.6	19.9
16	16	Rohm & Haas	962	8.5	96.1	Basic chemicals	333	11.7	103.4	17.0	1293	95.2	25.8
17	18	American Cyanamid	1,898	10.4	49.2	Basic chemical	135	27.0	38.4	7.1	1273	53.7	10.6
18	15	Hercules	1,823	−9.2	70.9	Basic chemicals	129	6.6	61.4	7.1	1335	78.9	9.7
19	20	Air Products[f]	1,604	13.7	92.5	Basic chemicals	292	49.2	107.1	18.2	1731	74.3	16.9
20	25	Ciba-Geigy	1,560	21.0	66.1	Specialty chemicals	na	na	na	0.0	na	na	na
21	29	Texaco	1,538	35.3	3.2	Petroleum	39	def	1.0	2.5	1008	3.0	3.9
22	21	Stauffer Chemical[f]	1,504	12.2	100.0	Basic chemicals	129	def	100.0	8.6	1601	100.0	8.1
23	27	Ashland Oil	1,501	24.3	16.8	Petroleum	55	5400.0	21.8	3.7	503	14.6	10.9
24	22	Mobay	1,500	15.4	100.0	Basic chemicals	135[g]	103.9	100.0	9.0	na	na	na
25	26	American Hoechst	1,468[e]	20.1	83.4	Basic chemicals	na	na	na	0.0	na	na	na
26	24	Borden	1,448	11.8	31.7	Dairy products	170	23.5	41.2	11.7	1340	48.6	12.7
27	30	B. F. Goodrich	1,424	25.7	43.5	Rubber products	114	157.8	68.6	8.0	1366	56.5	8.4
28	32	U.S. Steel	1,365	21.0	7.1	Steel	57	def	3.6	4.2	613	3.5	9.3
29	19	Ethyl	1,365[e]	−7.7	81.5	Basic chemicals	190	21.6	85.2	13.9	790	80.8	24.0
30	31	Unocal Corp.	1,249	10.3	10.8	Petroleum	87[g]	18.1	12.5	7.0	747	7.3	11.7
31	23	FMC	1,236	−4.7	37.0	Machinery	187	10.6	47.5	15.1	985	53.4	19.0
32	35	BASF Wyandotte	1,185	14.6	100.0	Basic chemicals	34	72.2	100.0	2.9	na	na	na
33	33	Olin	1,174	5.6	56.8	Basic chemicals	61	−10.6	35.1	5.2	1021	62.9	5.9
34	34	Standard Oil of Calif.	1,100	3.9	4.0	Petroleum	11[g]	def	0.7	1.0	847	4.2	1.3
35	42	National Distillers	1,081	37.6	48.1	Alcoholic beverages	102	49.9	56.0	9.4	763	40.4	13.3
36	38	PPG Industries	993	12.6	23.4	Glass products	122	63.1	20.9	12.3	1150	35.8	10.6
37	28	Occidental Petroleum	985[h]	−13.4	6.1	Petroleum	69	def	4.2	7.0	991	8.1	6.9
38	36	International Minerals[f]	977	−1.9	62.3	Agrochemicals	146	−6.8	63.0	14.9	1323	67.3	11.0
39	40	Borg-Warner	944	14.3	24.1	Auto equipment	121	10.1	31.3	12.8	376	20.3	32.3
40	39	CF Industries	908[e]	5.3	100.0	Agrochemicals	54	58.4	100.0	6.0	1014	100.0	5.4
41	57	Koppers	885	8.2	48.7	Diversified	18	−15.4	22.9	2.0	468	43.3	3.8
42	43	Dow Corning	855	12.0	100.0	Specialty chemicals	91[g]	33.0	100.0	10.6	na	na	na
43	41	Lubrizol	832	5.3	100.0	Specialty chemicals	102	3.7	100.0	12.3	702	100.0	14.6
44	45	Williams Cos.	831	12.3	24.5	Agrochemicals	66	9628.6	17.7	8.2	932	20.6	7.3
45	37	Diamond Shamrock	820	−12.9	18.3	Petroleum	116	869.2	22.9	14.2	764	14.2	15.2
46	44	Reichhold Chemicals	801	7.2	100.0	Basic chemicals	44	26.1	100.0	5.4	361	100.0	12.1
47	58	Farmland Industries	783	44.5	14.9	Agricultural supplies	32	def	27.6	4.1	447	37.0	7.1
48	46	Eli Lilly	757	4.1	24.3	Drugs	108	10.0	13.2	14.2	773	21.2	13.9
49	48	Badische	709	5.6	100.0	Basic chemicals	33	11.2	100.0	4.8	518	100.0	6.3
50	56	Standard Oil (Ohio)	707	24.9	5.8	Petroleum	44	def	1.5	6.2	664	3.8	6.6

a Revised. b Operating profit defined as sales less administrative expense and cost of sales. c Operating profit from chemicals as a percentage of total operating profits. d Operating profit as a percentage of identifiable chemical assets. e Chemical sales include significant amounts of nonchemical products. f Fiscal year ended Sept. 30. g Chemical net profits. h Does not include

chemical operations

Rank 1984[a]	Rank 1983	Company	Chemical sales 1984 ($ millions)	Change from 1983	Chemical sales as % of total sales	Industry classification	Chemical operating profits[b] ($ millions)	Change from 1983	Chemical operating profits as % of total operating profits[a]	Operating profit margin[c]	Identifiable chemical assets ($ millions)	Chemical assets as % of total assets	Operating return on chemical assets[d]
51	52	Uniroyal	672	13.3	31.7	Rubber products	$110	69.0%	47.5%	16.4%	$443	39.0%	24.9%
52	49	Nalco Chemical	664	0.7	100.0	Specialty chemicals	115	−2.0	100.0	17.3	479	100.0	24.0
53	51	Pennwalt	656	8.3	62.6	Basic chemicals	52	19.8	66.4	7.9	506	69.9	10.2
54	65	Morton Thiokol[f]	654	45.9	32.7	Diversified	81	72.0	35.2	12.4	497	43.0	16.3
55	50	Merck	642	6.0	18.0	Drugs	73	49.3	9.7	12.2	596	16.8	13.1
56	55	Witco Chemical	623	9.0	41.6	Specialty chemicals	65	20.7	41.7	10.5	271	35.8	24.1
57	59	National Starch	561	10.5	66.6	Specialty chemicals	na	na	na	0.0	na	na	na
58	82	Engelhard	560	−1.1	22.3	Specialty metals	66	−7.9	58.7	11.8	442	51.2	14.9
59	63	Cabot[f]	542	17.8	30.9	Specialty metals	67	53.9	31.8	12.4	291	16.1	24.0
60	67	Kerr-McGee	520	18.5	14.7	Petroleum	−25	def	def	def	580	16.0	def
61	66	Freeport-McMoRan	493	11.9	58.6	Agrochemicals	110	47.8	87.3	22.2	220	11.5	49.8
62	62	International Flavors	477	3.4	100.0	Specialty chemicals	116	4.6	100.0	24.3	368	100.0	31.5
63	60	NL Industries	473	0.6	34.7	Petroleum services	95	50.8	91.1	20.1	283	21.6	33.5
64	68	Polysar	464	6.5	100.0	Basic chemicals	na	na	na	0.0	na	na	na
65	69	H. B. Fuller[f]	447	4.9	100.0	Specialty chemicals	32	−3.4	100.0	7.2	226	100.0	14.2
66	47	Georgia-Pacific	446	−34.7	6.3	Wood products	−134	def	def	def	158	3.3	def
67	70	Henkel	430	7.5	100.0	Specialty chemicals	na	na	na	0.0	na	na	na
68	72	Liquid Air	426	9.3	84.9	Basic chemicals	52	6.6	96.3	12.2	na	na	na
69	61	Sun Co.	422	−9.6	2.7	Petroleum	na	na	na	0.0	na	na	na
70	73	InterNorth	396	5.7	5.3	Natural gas	47	76.8	8.1	11.9	636	10.8	7.4
71	71	Pfizer	377	−4.4	9.8	Drugs	5	−10.0	0.5	1.2	382	9.4	1.2
72	90	Terra Chemicals	370	30.7	100.0	Agrochemicals	na	na	na	0.0	na	na	na
72	81	Rhône-Poulenc	370	27.6	100.0	Specialty chemicals	na	na	na	0.0	na	na	na
74	89	SCM[f]	361	43.9	18.1	Paint	37	144.3	32.4	10.2	317	27.3	11.6
75	74	GAF	357	10.5	48.8	Specialty chemicals	79	22.3	87.2	22.1	204	45.1	38.8
76	78	Soltex	350	16.7	100.0	Basic chemicals	na	na	na	0.0	na	na	na
77	84	Mississippi Chemical[f]	349	32.8	100.0	Farm cooperative	4	−2.9	100.0	1.2	352	100.0	1.2
78	77	Tyler	346	13.6	37.2	Diversified chemical	7	−67.3	22.9	2.1	160	33.2	4.5
79	79	Big Three Industries	339	15.6	43.7	Petroleum services	76	6.8	62.0	22.3	576	49.9	13.1
80	80	Upjohn	325	11.7	14.9	Drugs	−9	def	def	def	191	8.5	def
81	88	Chemed	318	26.2	91.8	Specialty chemicals	42	20.2	90.4	13.1	151	85.5	27.7
81	75	American Petrofina	318	2.5	14.9	Petroleum	20	293.1	38.1	6.4	308	18.8	6.6
83	—	Betz Laboratories	304	13.8	100.0	Specialty chemicals	60	18.4	100.0	19.9	221	100.0	27.4
84	86	Vulcan Materials	302	18.1	30.7	Nonmetallic minerals	47	224.0	35.8	15.6	na	na	na
85	83	Petrolite[k]	284	6.6	96.7	Specialty chemicals	41	23.5	105.2	14.2	160	72.4	25.2
86	93	Great Lakes Chemical	278	23.1	100.0	Specialty chemicals	57	44.2	100.0	20.3	284	100.0	19.9
87	91	Aluminum Co. of America	273	13.5	4.8	Nonferrous metals	na	na	na	0.0	na	na	na
87	92	Ferro	273[e]	13.4	41.1	Specialty materials	16	−9.8	31.7	5.8	140	42.5	11.2
89	87	Baker Industries	264	4.5	100.0	Agrochemicals	16	1521.4	100.0	6.1	341	100.0	4.8
90	85	Emhart	261	1.0	14.6	Machinery	23	−4.6	10.9	8.7	111	11.6	20.5
91	53	Kaiser Aluminum	249	−57.3	7.8	Nonferrous metals	39	58.6	67.0	15.6	281	8.0	13.8
92	94	Loctite	242	12.0	100.0	Specialty chemicals	43	48.0	100.0	17.8	227	100.0	18.9
93	96	Stepan	235	13.4	100.0	Specialty chemicals	6	−45.0	100.0	2.6	134	100.0	4.6
94	—	Northwest Industries	218	2.5	15.1	Diversified	27	13.2	11.9	12.3	163	10.7	16.2
95	97	Essex Chemical[f]	176	4.2	100.0	Basic chemicals	27	59.3	100.0	15.4	111	100.0	24.4
96	98	Agway	166	2.1	4.0	Farm cooperative	na	na	na	0.0	na	na	na
97	—	First Mississippi	165	52.5	61.2	Agrochemicals	28	37.3	64.8	17.2	82	25.9	34.6
98	100	Sterling Drug	145	6.1	7.9	Diversified	9	21.6	3.4	6.0	118	8.1	7.4
99	—	Sigma-Aldrich	138	18.4	76.9	Specialty chemicals	39	24.2	89.4	28.2	149	85.7	26.1
100	—	Crompton & Knowles	115	−1.8	50.0	Specialty chemicals	14	5.9	64.3	11.8	68	56.3	20.1

all chemical sales. f Fiscal year ends June 30. j Fiscal year ends Nov. 30. k Fiscal year ends Oct. 31. na = not available. def = deficit.

FINANCIAL ANALYSIS: Most measures improved modestly in 1984

		Profit margin[a]	Return on investment[b]	Debt as % debt plus equity	% total sales abroad[c]	% total assets abroad[d]	Sales per employee[e]	Dividends as % of net income	CAPITAL SPENDING[f] as % of sales	CAPITAL SPENDING[f] as % of net plant	R&D as % of sales	Sales as % of assets	Net plant as % of gross plant
SALES OVER $1 BILLION													
Air Products[g]	1984	8.1%	4.2%	25.3%	17.4%	16.3%	$ 98	23.0%	15.1%	16.5%	2.5%	74.5%	56.9%
	1983	6.7	3.5	26.3	19.3	17.8	96	25.4	15.1	16.0	2.4	73.6	59.0
American Cyanamid	1984	5.8	4.8	24.0	30.3	21.7	101	42.2	5.2	16.1	6.1	115.9	45.9
	1983	4.7	4.0	24.5	32.4	23.9	91	51.3	4.7	13.1	6.1	115.7	47.9
Celanese	1984	4.8	3.2	36.2	21.0	18.4	92	41.6	8.3	19.0	3.0	116.0	39.9
	1983	3.6	2.5	39.7	22.0	25.1	140	56.3	3.2	7.3	2.7	113.7	38.9
Dow Chemical	1984	4.8	3.6	35.2	53.6	45.9	229	63.2	6.8	15.1	4.4	290.5	46.0
	1983	2.5	1.7	35.7	52.3	45.4	201	128.9	5.6	11.1	4.5	91.4	49.4
Ethyl	1984	7.9	8.4	36.4	24.5	10.5	152	25.0	6.2	16.0	2.4	113.1	51.4
	1983	6.6	6.8	25.6	15.5	11.1	134	31.7	4.9	13.5	2.3	115.6	51.9
W. R. Grace	1984	2.9	3.0	40.7	18.9	14.0	84	69.8	5.6	14.1	1.2	126.3	59.3
	1983	2.6	2.6	38.2	20.0	14.5	79	85.3	5.7	13.0	1.1	123.5	61.8
Hercules	1984	7.7	6.8	23.5	17.7	13.2	98	40.1	8.5	24.1	2.8	107.6	46.8
	1983	5.7	5.6	21.4	21.0	15.4	109	44.1	6.4	21.2	2.8	120.9	45.5
International Minerals[h]	1984	7.3	4.2	27.2	20.5	8.6	170	62.3	6.8	9.2	na	78.0	55.5
	1983	5.4	3.1	29.3	20.4	9.4	176	86.2	8.1	10.1	na	76.1	59.6
Monsanto	1984	6.6	4.6	18.5	26.6	20.6	132	41.5	9.2	18.2	6.7	105.0	48.8
	1983	6.2	4.1	20.4	27.0	18.2	124	43.8	8.9	17.1	4.6	98.0	49.5
Morton Thiokol	1984	5.5	8.3	19.0	14.1	12.7	108	26.3	4.5	17.2	1.5	154.1	69.6
	1983	5.2	6.7	21.3	15.3	16.4	90	30.1	4.7	13.6	1.5	131.1	72.8
National Distillers	1984	3.1	3.4	25.3	na	na	na	108.2	5.2	15.5	na	118.8	58.1
	1983	2.6	3.1	25.9	na	na	na	121.0	2.8	9.1	na	131.2	59.2
Olin	1984	4.3	3.1	29.9	7.5	8.4	116	35.9	8.0	19.2	2.6	113.3	41.9
	1983	3.7	2.6	31.3	7.3	9.9	106	40.9	6.3	14.4	2.6	105.8	44.1
PPG Industries	1984	7.1	5.9	17.8	22.3	21.4	113	32.4	7.4	13.9	3.5	111.7	59.2
	1983	6.3	4.7	21.1	22.1	22.6	100	36.9	12.2	20.5	3.5	101.9	59.6
Pennwalt	1984	4.3	3.8	19.0	16.0	11.9	107	67.4	8.3	22.1	3.5	117.9	51.5
	1983	4.6	3.9	26.9	16.6	12.4	100	61.2	7.1	20.0	3.4	111.9	51.2
Rohm & Haas	1984	8.4	7.6	15.1	32.6	26.0	172	26.8	6.6	24.2	5.4	125.0	38.4
	1983	7.5	6.4	20.1	35.4	24.6	165	27.4	3.8	13.8	5.4	124.1	38.6
Stauffer Chemical[i]	1984	1.1	0.6	24.4	17.1	13.0	129	382.9	7.5	10.4	4.4	74.9	53.6
	1983	def	def	24.8	20.3	10.9	138	def	7.7	9.2	4.7	65.4	57.8
Union Carbide	1984	3.6	2.4	32.4	28.5	29.0	97	70.4	7.0	10.5	2.8	90.4	57.3
	1983	2.8	1.8	32.6	31.2	30.3	90	96.3	8.5	12.1	2.7	87.4	58.7
Williams Cos.	1984	4.3	2.9	59.3	na	na	183	29.6	7.7	8.1	na	74.7	79.5
	1983	2.5	1.1	60.4	na	na	112	67.0	11.7	7.9	na	46.2	79.0
Wilco Chemical	1984	4.2	6.1	27.7	13.6	12.1	na	32.7	4.4	18.8	na	197.9	53.0
	1983	3.8	5.4	30.4	14.6	13.7	na	34.8	3.2	14.3	na	189.1	53.4
MEDIAN 1984		4.8%	3.8%	25.3%	20.5%	14.8%	$113	41.6%	7.0%	16.5%	2.8%	113.3%	53.0%
MEDIAN 1983		3.8%	3.3%	27.1%	20.7%	17.1%	$111	43.5%	7.8%	13.3%	2.8%	108.8%	55.0%

a Net income as a percentage of sales. b Net income as a percentage of current assets plus gross plant. c Consolidated sales only. d Foreign identifiable assets as a percentage of total assets. e Thousands of dollars. f Actual spending on construction of new facilities and purchase of new equipment and land in consolidated businesses. g For fiscal year ended Sept. 30, 1984. h

		Profit margin[a]	Return on investment[b]	Debt as % debt plus equity	% total sales abroad[c]	% total assets abroad[d]	Sales per employee[e]	Dividends as % of net income	CAPITAL SPENDING[f] as % of sales	as % of net plant	R&D as % of sales	Sales as % of assets	Net plant as % of gross plant
SALES LESS THAN $1 BILLION													
Baker Industries	1984	def	def	52.6%	na	na	$311	def	5.8%	8.6%	na	77.4%	66.8%
	1983	0.4%	0.3%	52.2	22.7%	na	297	0.0	3.8	5.5	na	77.3	68.5
Betz Laboratories	1984	12.1	15.4	0.2	13.5	13.5	124	49.3	8.3	23.2	3.6	137.7	67.2
	1983	13.7	17.9	0.3	14.3	12.9	118	42.2	12.3	34.1	3.0	130.8	69.2
Chemed	1984	5.8	13.0	47.3	10.5	9.9	67	64.7	2.7	22.7	0.8	165.5	62.5
	1983	6.4	12.1	44.6	13.4	11.2	na	62.6	2.1	16.3	0.9	137.9	62.4
Crompton & Knowles	1984	3.4	5.7	21.0	18.9	19.9	100	53.2	1.7	12.7	1.9	188.0	53.7
	1983	2.7	4.6	24.6	19.3	21.2	96	61.9	1.3	9.5	1.9	182.6	56.6
Essex Chemical	1984	5.2	5.6	51.8	na	na	207	31.9	3.9	10.9	2.0	129.3	62.1
	1983	2.9	2.9	59.1	na	na	187	55.1	6.4	16.2	1.8	116.0	66.2
First Mississippi[h]	1984	6.9	3.5	31.8	na	na	335	31.0	15.2	19.6	na	70.9	59.9
	1983	6.9	3.4	35.3	na	na	251	34.8	23.2	23.6	na	53.8	64.4
Freeport-McMoRan	1984	11.2	3.7	42.7	na	na	175	45.3	22.6	12.1	na	44.2	66.8
	1983	11.5	4.6	27.2	na	na	164	47.3	29.6	21.3	na	55.4	62.6
H. B. Fuller[i]	1984	2.9	5.0	34.0	37.7	49.8	104	20.8	2.9	14.6	2.1	189.4	65.9
	1983	3.2	5.6	36.0	39.0	50.9	104	18.1	3.5	18.3	2.0	188.4	67.0
Great Lakes	1984	12.6	10.6	16.8	na	na	167	0.9	10.2	22.0	3.5	99.6	61.0
	1983	10.5	8.5	15.1	19.9	na	na	0.7	10.4	19.3	3.4	99.5	63.9
International Flavors	1984	14.5	12.8	0.0	62.3	46.7	129	57.8	4.4	14.9	6.8	105.4	57.9
	1983	14.8	12.7	0.0	65.6	48.5	125	56.1	5.8	19.2	6.9	100.6	59.3
Lawter International	1984	15.1	16.0	7.6	31.5	29.1	na	64.4	3.4	15.6	1.8	126.3	56.1
	1983	15.9	16.1	8.1	31.3	37.6	na	59.4	3.7	15.6	1.8	119.0	59.4
Liquid Air	1984	5.4	3.5	39.9	33.9	36.9	na	78.4	12.5	16.9	1.9	55.8	56.7
	1983	5.2	3.4	31.5	34.7	35.9	113	89.5	9.1	11.7	1.8	65.8	60.5
Loctite[h]	1984	10.9	11.6	10.7	39.0	45.1	98	20.5	2.8	13.6	3.1	106.3	62.2
	1983	7.9	8.2	10.8	40.5	45.0	92	32.7	4.6	21.3	2.8	101.3	66.4
Lubrizol	1984	8.1	7.6	6.0	52.0	31.6	198	64.7	3.5	11.7	3.9	118.5	48.5
	1983	8.1	7.5	5.5	52.3	36.5	192	65.4	3.1	9.1	4.6	117.2	54.7
Nalco Chemical	1984	11.0	11.6	5.1	21.5	20.9	140	64.4	7.9	25.6	4.8	138.6	48.1
	1983	10.8	11.5	5.0	21.0	21.0	143	63.9	6.1	21.1	4.5	134.8	49.3
Petrolite[h]	1984	8.8	8.3	4.6	18.9	14.9	na	47.3	3.8	15.7	3.8	132.8	43.8
	1983	7.7	7.7	5.5	19.5	15.1	na	53.8	3.2	12.3	4.0	137.7	48.2
Reichhold Chemicals	1984	3.2	5.4	18.8	10.3	11.0	191	23.7	3.0	14.1	2.3	214.4	57.5
	1983	2.7	4.2	21.6	11.1	11.4	na	31.3	2.6	11.0	2.2	194.2	59.3
Sigma-Aldrich	1984	13.5	12.6	9.3	11.6	8.4	82	16.6	6.6	25.9	na	103.1	66.1
	1983	13.1	13.4	5.3	12.3	9.9	na	19.8	5.2	20.2	na	107.2	77.4
Stepan	1984	2.3	2.7	41.6	na	na	270	38.9	4.9	15.8	3.4	175.4	51.2
	1983	3.0	3.3	27.1	na	na	236	33.3	4.7	12.9	3.4	142.8	55.9
MEDIAN 1984		8.1%	7.6%	18.8%	21.5%	20.9%	$154	45.3%	4.4%	15.6%	3.1%	126.3%	59.9%
MEDIAN 1983		6.7%	5.2%	25.8%	21.0%	36.2%	$154	54.5%	4.7%	16.3%	2.8%	116.8%	60.0%

For fiscal year ended June 30, 1984. f For fiscal year ended Nov. 30, 1984. j For fiscal year ended Nov. 30, 1984. k For fiscal year ended Oct. 31, 1984. Notes: Net income is from continuing operations, excluding extraordinary and nonrecurring items where possible. na = not available. def = deficit.

INDUSTRY CAPITAL SPENDING: Budgets rise to a new high for the chemical industry

$ Billions	1985[a]	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975
Chemicals	$ 16.46	$ 14.99	$ 12.96	$ 12.66	$ 13.11	$ 11.63	$ 9.81	$ 7.76	$ 7.35	$ 7.37	$ 7.12
Iron and steel	3.77	3.15	3.25	3.78	3.48	3.44	3.21	2.60	2.88	3.13	3.08
Nonferrous metals	2.71	2.77	1.74	1.90	2.51	2.13	1.65	1.46	1.30	1.42	1.72
Paper	8.43	7.42	5.92	5.60	6.11	6.52	5.24	3.80	3.48	2.99	2.93
Petroleum	28.49	26.14	23.14	26.39	25.98	19.57	15.24	13.16	11.82	10.02	9.07
Rubber	2.71	2.35	2.46	2.16	2.15	2.03	2.46	2.33	1.77	1.37	1.20
Stone, clay, glass	2.89	2.61	2.77	2.90	3.41	3.98	3.99	3.15	2.30	1.91	1.67
All manufacturing	146.25	131.01	116.20	120.68	126.54	112.33	95.92	75.58	67.48	58.53	53.66

a Estimate. **Source:** Department of Commerce

Chemical industry has a growing backlog of unspent capital funds

$ Billions	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
Chemicals	$ 7.8	$ 7.5	$ 7.4	$ 9.4	$ 9.8	$ 8.5	$ 7.2	$ 7.4	$ 7.1	$ 6.9	$ 6.6
Iron and steel	2.1	2.2	2.7	5.4	3.9	4.5	4.0	3.6	4.7	5.4	5.8
Nonferrous metals	2.4	3.2	3.2	3.7	3.7	2.9	2.7	2.9	2.4	2.2	2.7
Paper	6.0	4.0	5.1	5.1	4.0	4.2	3.2	2.6	2.0	2.7	2.9
Petroleum, coal	25.3	22.3	22.9	29.7	26.7	16.1	14.6	15.0	12.2	14.1	12.8
Rubber	1.3	1.1	1.0	0.9	1.0	0.9	0.9	0.8	0.7	0.6	0.7
Stone, clay, glass	2.1	1.5	1.6	1.9	2.0	2.3	2.4	2.0	1.5	1.4	1.7
All manufacturing	97.2	73.7	70.8	92.7	91.9	76.7	63.4	56.5	47.5	46.4	49.8

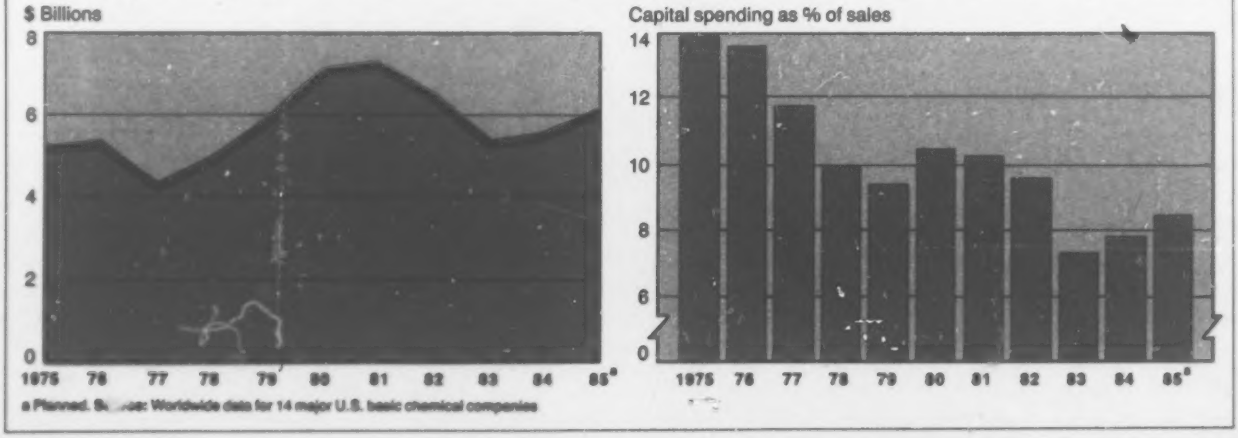
Note: Figures are for the fourth quarter of each year. **Source:** Conference Board

Capital spending overseas is rising for U.S. chemical firms

$ Billions	1985[a]	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975
Chemicals and allied products	$ 3.0	$ 2.5	$ 2.3	$ 2.8	$ 3.0	$ 3.0	$ 2.6	$ 1.9	$ 2.0	$ 2.7	$ 2.5
Metals, primary and fabricated	1.0	1.1	0.9	0.9	0.8	0.9	0.6	0.6	0.5	0.7	0.7
Petroleum	17.3	16.2	15.5	19.7	15.8	14.8	11.0	9.5	8.9	7.9	8.9
All manufacturing	17.7	14.5	13.7	16.8	19.2	19.5	15.4	12.0	10.5	10.9	11.3

a By majority-owned foreign affiliates of U.S. companies; data after 1976 are not consistent with earlier years. **Source:** Department of Commerce

Capital spending by chemical firms has recovered moderately, but is low compared to sales



a Planned. **Source:** Worldwide data for 14 major U.S. basic chemical companies

Chemical capital spending once again is on the rise, according to a number of surveys. But these surveys don't agree on just how big that rise will be.

C&EN's survey of 14 basic chemical producers indicates that capital spending in 1984 increased 6% from 1983 to $5.4 billion, and that these companies will spend 12% more (about $6 billion) in 1985. Capital outlays as a percentage of sales will increase to 8.4% from 7.8% in 1984. This, however, is still below its historic level of 11 to 12%.

The Commerce Department, on the other hand, sees bigger increases for chemicals. Its survey of spending on new plant and equipment for the broader chemicals and allied products industry shows that growth of capital spending actually will slow in 1985. The Commerce Department predicts that chemical capital spending this year will rise 10% to $16.5 billion, compared with an increase of almost 16% in 1984.

The Commerce Department survey also shows that the increase for the chemical industry will trail that for all manufacturing in 1985, with manufacturing slated to grow 12% to $146.3 billion. But, according to the government survey, chemicals outpaced the 13% increase for all manufacturing in 1984.

A survey by the Conference Board also points to increased capital spending in 1985, based on the backlog of appropriated but unspent capital funds. This backlog increased 4% to $7.8 billion for the chemical industry by the end of the fourth quarter of 1984 from the same period the year before. This increase is small when compared with that for all manufacturing, however. The backlog of unspent capital funds for all manufacturing at the end of the fourth quarter had climbed 32%, to a hefty $97.2 billion, from the end of 1983.

According to the Commerce Department, overseas capital spending by chemical producers again will be picking up this year. The department's survey of capital spending by majority-owned affiliates of U.S. firms shows that chemical capital expenditures will rise 20% to about $3 billion in 1985, following a 9% rise in 1984. The increase in overseas spending for all manufacturing in 1985 will be 22% to $17.7 billion, following an increase of 6% in 1984.

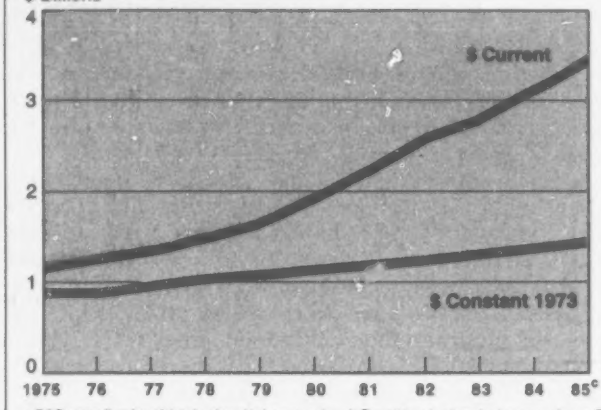
A resurgence in capital spending in the chemical industry is not surprising. Although in many sectors of the economy capital expenditures have been growing well since the recession, the chemical industry has been lagging. Returns on investment often did not justify the cost of money needed for capital expansion. However, capacity use in the industry continues to tighten, allowing producers to raise prices and increase profitability. At the same time, as interest rates decline, borrowing for expansion has come to look more and more attractive.

CHEMICAL CAPITAL SPENDING: Budgets for most companies are up for second straight year

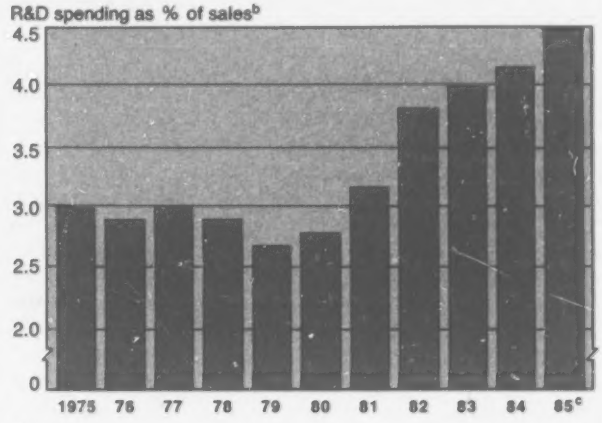
$ Millions	1985[a]	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975
Air Products	$ 325	$ 263	$ 246	$ 347	$ 323	$ 364	$ 246	$ 200	$ 143	$ 162	$ 151
American Cyanamid	200	200	165	171	181	196	235	251	235	232	204
Celanese	200	275	105	275	414	253	245	248	243	223	208
Dow Chemical	830	781	630	829	1176	1184	1268	1075	1163	1200	935
Du Pont[b]	1700	1185	1276	1300	1420	1297	864	714	704	876	1036
Ethyl	116	103	85	92	141	156	123	96	88	88	69
W. R. Grace	420	380	353	560	657	658	514	313	279	234	309
Hercules	210	218	168	174	167	229	186	116	127	150	151
Monsanto	575	614	560	673	668	781	566	480	607	647	528
Olin	170	165	123	139	186	172	161	163	208	166	99
PPG Industries	400	315	450	452	376	401	252	261	212	177	176
Rohm & Haas	130	134	72	126	182	93	68	66	79	110	106
Stauffer Chemical	137	112	104	177	239	246	239	201	193	199	199
Union Carbide	650	670	761	1179	1186	1129	831	688	805	965	862
TOTAL	$6063	$5415	$5097	$6493	$7316	$7159	$5798	$4872	$5086	$5429	$5033
ANNUAL CHANGE	12%	6%	−21%	−11%	2%	23%	19%	−4%	−6%	8%	18%

a Planned. b Excludes Conoco. Note: Figures are for worldwide spending on construction, equipment, and land in consolidated businesses. Where possible, acquisition costs and investments in nonconsolidated businesses are excluded. Source: Company data

Chemical companies' R&D budgets maintain steady growth pace . . .



. . . as spending wins a bigger share of total revenues



a R&D spending by 15 basic chemical companies. b For 15 basic chemical companies. c Estimated.
Sources: Worldwide data for 15 U.S. basic chemical companies, Battelle Columbus Laboratories, C&EN estimates

R&D spending by the U.S. chemical industry is rising a solid 10% this year, according to C&EN's survey of 15 basic chemical companies. Although down slightly from the 11% rise recorded in 1984, the planned increase marks the second consecutive year of double-digit growth for research budgets.

More significant, major chemical producers are devoting a greater share of their resources to research. R&D spending as a per cent of corporate sales stayed mostly below 3% throughout the 1970s, reaching a low of 2.7% in 1979. Growth has been uninterrupted since then and will soar to 4.5% this year.

With most large chemical producers scrambling to develop value-added products targeted for specialty markets, it is not surprising that R&D spending is surging. In the 1970s, chemical companies concentrated on process research, seeking incremental improvements in the production economics of commodity chemicals. Now many are emphasizing product research, which tends to be more expensive. The rate of introducing new products, particularly specialty polymers and agricultural chemicals, has increased.

Adjusted for anticipated inflation in R&D costs, research spending will rise just under 4% this year, a small amount compared to the constant-dollar increases of the early 1980s. That figure looks better, however, considering the likelihood that chemical sales, adjusted for inflation, will rise little if at all in 1985.

CHEMICAL R&D SPENDING: Double-digit increases continue for second year

$ Millions	1985[a]	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975
Air Products	$ 51	$ 44	$ 40	$ 37	$ 32	$ 30	$ 24	$ 23	$ 24	$ 19	$ 16
American Cyanamid	250	237	215	190	172	148	130	108	96	83	73
Celanese	105	94	85	100	104	94	92	83	77	70	64
Dow Chemical	530	507	492	460	404	314	269	232	203	188	167
Du Pont[b]	1100	1000	875	775	647	591	509	461	367	353	336
Ethyl	42	40	39	39	37	34	29	25	28	25	19
W. R. Grace	90	79	71	62	55	45	42	37	32	28	30
Hercules	79	72	74	74	65	57	50	43	40	37	32
Lubrizol	38	38	37	36	33	28	23	21	19	17	17
Monsanto	450	370	290	264	233	208	161	136	132	114	116
Olin	53	54	51	47	39	31	26	25	25	23	24
PPG Industries	185	150	127	127	119	103	83	70	61	56	50
Rohm & Haas	120	109	100	92	77	67	54	49	45	43	39
Stauffer Chemical[c]	68	66	63	57	49	44	35	32	32	28	23
Union Carbide	280	265	245	240	207	166	161	156	156	143	120
TOTAL	$3441	$3125	$2804	$2600	$2273	$1960	$1688	$1501	$1337	$1227	$1126
ANNUAL CHANGE	10%	11%	8%	14%	16%	16%	12%	12%	9%	9%	9%

a Planned. b Excludes petroleum and coal segments. c All figures are restated for fiscal year ending Sept. 30; Stauffer Chemical was acquired by Chesebrough-Pond's in first-quarter 1985.
Sources: Company data and estimates

INDUSTRY BALANCE SHEET: Little change overall but liquidity is lower

Industrial chemicals and synthetics

Assets	1984 ($ billions)	1983 ($ billions)	Change
Current assets:			
Cash on hand and in U.S. banks	$ 1.10	$ 1.28	−14%
Short-term securities	1.29	1.57	−18
Receivables	13.12	14.01	−6
Inventories	12.26	11.60	6
Other current assets	2.89	2.25	28
Total	**30.65**	**30.71**	**0**
Fixed assets:			
Property, plant, and equipment			
Depreciable fixed assets	82.17	79.31	4
Land and mineral rights	3.44	3.18	8
Less: accumulated depreciation and depletion	41.48	38.24	8
Net fixed assets	**44.13**	**44.25**	**0**
Other assets, including investments and intangibles	**19.27**	**17.20**	**12**
TOTAL ASSETS	**$94.06**	**$92.16**	**2%**

Liabilities and stockholders' equity	1984 ($ billions)	1983 ($ billions)	Change
Current liabilities			
Short-term debt	$ 1.89	$ 1.74	8%
Accounts payable	6.75	6.79	−1
Accrued income taxes	1.44	1.24	16
Current portion of long-term debt	1.27	1.11	14
Other current liabilities	9.69	8.91	9
Total	**21.04**	**19.79**	**6**
Long-term debt	**18.14**	**19.43**	**−7**
Other noncurrent liabilities, including deferred taxes and minority interest	**8.02**	**7.68**	**4**
TOTAL LIABILITIES	**47.19**	**46.91**	**1**
Stockholders' equity			
Capital stock and other capital	17.06	17.79	−4
Retained earnings	29.82	27.47	9
TOTAL STOCKHOLDERS' EQUITY	**46.87**	**45.26**	**4**
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	**$94.06**	**$92.16**	**2%**

Source: Bureau of the Census

DEBT RATIOS: At the lowest level in a decade for chemical producers

$ Billions	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
INDUSTRIAL CHEMICALS AND SYNTHETICS											
Long-term debt	$18.1	$19.4	$22.0	$21.4	$13.8	$14.8	$13.6	$12.3	$11.8	$10.2	$ 7.8
Stockholders' equity	$46.9	$45.3	$45.9	$42.5	$39.8	$32.3	$29.3	$26.3	$25.0	$22.8	$20.5
Debt ratio[a]	27.9%	30.0%	32.4%	33.5%	29.6%	31.4%	31.8%	31.9%	32.0%	30.8%	27.6%
CHEMICALS AND ALLIED PRODUCTS											
Long-term debt	$35.9	$36.2	$38.2	$36.9	$28.3	$24.9	$23.5	$21.1	$19.4	$16.8	$12.8
Stockholders' equity	$101.5	$97.2	$95.3	$89.9	$79.5	$67.4	$60.8	$54.9	$50.8	$45.7	$40.9
Debt ratio[a]	26.1%	27.2%	28.6%	29.1%	26.3%	27.0%	27.9%	27.8%	27.6%	26.9%	23.8%
ALL MANUFACTURING											
Long-term debt	$325.8	$286.6	$293.1	$266.5	$236.2	$204.8	$182.0	$167.3	$153.6	$145.2	$130.1
Stockholders' equity	$884.2	$837.6	$783.0	$762.3	$699.7	$624.0	$560.8	$511.7	$475.3	$435.5	$408.4
Debt ratio[a]	26.9%	25.5%	27.2%	25.9%	25.2%	24.7%	24.5%	24.6%	24.4%	25.0%	24.2%

a Long-term debt as a percentage of long-term debt plus stockholders' equity. **Note:** Because of changes in accounting rules and industry classifications, numbers over the entire range of years are not strictly comparable. **Source:** Bureau of the Census

CASH FLOW: With profits up last year, borrowing becomes less important as a source of funds

$ Millions, % of total	1984		1983		1982		1981		1980	
SOURCES OF FUNDS										
Net income	$ 3,917	29.5%	$ 2,735	21.5%	$ 2,347	19.4%	$ 3,629	17.1%	$3354	33.9%
Depreciation and depletion	4,699	35.4	4,633	36.4	4,346	36.0	3,633	17.1	3275	33.1
Deferred taxes	591	4.4	362	2.8	570	4.7	906	4.3	603	6.1
Other internal sources	2,496	18.8	2,591	20.4	1,841	15.2	1,308	6.1	496	5.0
Long-term debt	1,451	10.9	1,899	14.9	2,554	21.1	7,190	33.9	1892	19.1
Stock	135	1.0	514	4.0	427	3.5	4,567	21.5	282	2.8
TOTAL	**$13,288**	**100.0%**	**$12,734**	**100.0%**	**$12,085**	**100.0%**	**$21,233**	**100.0%**	**$9902**	**100.0%**
APPLICATIONS OF FUNDS										
Dividends	$ 1,891	14.2%	$ 1,754	13.8%	$ 1,682	13.9%	$ 1,569	7.4%	$1368	13.8%
Capital expenditures	6,335	47.7	5,619	44.1	7,192	59.5	6,975	32.9	5867	59.3
Additions to working capital	−16	−0.1	−343	−2.7	−1,548	−12.8	3,576	16.8	648	6.5
Reduction of long-term debt	2,649	19.9	3,380	26.6	3,398	28.1	1,081	5.1	968	9.8
Other applications	2,429	18.3	2,324	18.2	1,361	11.3	8,032	37.8	1050	10.6
TOTAL	**$13,288**	**100.0%**	**$12,734**	**100.0%**	**$12,085**	**100.0%**	**$21,233**	**100.0%**	**$9902**	**100.0%**

Note: Data are totals for 12 major chemical companies: American Cyanamid, Celanese, Dow Chemical, Du Pont, Ethyl, Hercules, Monsanto, Olin, Pennwalt, Rohm & Haas, Union Carbide, and Williams Cos. **Source:** Company annual reports

2 Finances of the U.S. Chemical Industry

Last year brought continued improvement to the financial status of U.S. producers of chemicals and drugs. This is clear from the annual data for 33 individual chemical companies and 16 pharmaceutical firms presented on this and the following four pages.

With production up nearly 7% for basic chemicals and synthetic materials nationwide, 90% of the chemical companies reported higher sales in 1984 than in the year before. Higher earnings were equally widespread. For nearly three fourths of the companies, in fact, earnings did even better than sales, with a resulting widening of profit margins. With chemicals more in demand and adequate cash flow from income and depreciation available, about four out of five of the companies hiked their spending for new plant and equipment. At the same time, a strong majority also were more generous to stockholders; 70% of the companies raised dividend payments during 1984.

Despite the gains of the past couple of years, however, for a majority of the chemical companies earnings remained below the levels of four or five years ago. Profitability, too, was still less than it had been in the early 1980s.

The annual figures for 1984, moreover, cloud the trend in financial results as the year developed. Growth in sales and earnings was strongest during the early months of the year and weakened steadily as the year progressed. This trend is continuing during the first half of 1985. Profits so far this year, in fact, are trailing significantly behind those of early last year.

Explanation of table headings

Year. Data are for calendar year unless otherwise indicated.

Net sales. Gross sales, less discounts, allowances, and returns; generally excludes excise taxes and other operating income or revenues.

Net income. Net sales and other income, less operating costs, nonoperating charges, depreciation, depletion, interest expense, deferred charges, minority interest in income, and taxes. Nonrecurring or extraordinary credits and charges have been excluded in most cases, but these items are indicated by a footnote.

Total assets. Sum at year's end of current assets, investments, prepaid expenses, net plant and equipment, and other tangible assets. Excludes insofar as possible intangible assets including goodwill, value of patents and trademarks, and the like.

Current ratio. The ratio of current assets (cash, marketable securities, receivables, and inventories but excluding prepaid expenses) to total current liabilities.

Net plant and equipment. Value at year's end of fixed assets, less accumulated depreciation, amortization, and depletion.

Capital expenditures. Total spending during the year for new fixed assets, such as plant, equipment, and land, and for replacement and modernization of facilities.

Net worth. Equity at year's end of preferred and common stock holders, including value of capital stock, capital and earned surplus, and surplus reserves, as well as contingency and miscellaneous reserves for which no definite purpose is stated. Intangible assets are deducted insofar as possible.

Net income (breakdown). **Per cent of sales:** net income divided by net sales. **Per cent of net worth:** net income divided by tangible net worth. **Dollars per share:** net income, less preferred dividends, divided by the number of shares of common stock outstanding. All figures are adjusted for stock splits, but no adjustment has been made for earlier years as a result of stock dividends or for dilution that might result from the conversion of preferred stock or debt to common stock or the exercise of stock options outstanding.

Dividends per share. Cash dividends paid (or declared) on each share of common stock; excludes the value of stock dividends, which are indicated by a footnote.

Dividend yield. Dividends per share divided by the average of the high and low prices of the common stock during the calendar year.

Stock price range. High-low market prices of common stock during the calendar year, adjusted for stock splits but not for stock dividends.

Price-earnings ratio. Average of the high and low prices of the common stock during the calendar year divided by net income per share.

Year	Net sales	Net income	Total assets	Current ratio	Net plant and equipment	Capital expenditures	Net worth	NET INCOME % of sales	NET INCOME % of net worth	NET INCOME $ per share	Dividends, $ per share	Dividend yield, % of price	Stock price range, $ per share	Price-earnings ratio
	Money figures in thousands of dollars unless otherwise indicated													
CHEMICALS														
Air Products & Chemicals														
1984[a]	$1,735,115	$140,618	$2,267,457	1.1	$1,587,382	$262,491	$1,058,328	8.1%	13.3%	$4.55	$1.05	2.5%	$48⅜–36½	9.3
1983[a]	1,634,246	108,963	2,160,157	1.1	1,541,345	246,417	988,256	6.7	11.0	3.55	0.90	2.1	51–34	12.0
1982[a]	1,568,916	105,654[b]	2,118,882	1.2	1,497,162	346,680	867,565	6.7	12.2	3.68[b]	0.80	2.5	41⅞–23⅝	8.8
1981[a]	1,570,115	126,039	1,871,986	1.2	1,301,922	323,465	769,134	8.0	16.4	4.42	0.80	1.9	48⅞–34	9.4
American Cyanamid Co.														
1984	$3,856,725	$215,918	$3,304,027	1.9	$1,241,927	$200,110	$1,645,122	5.6%	13.1%	$4.41	$1.86	3.9%	$53⅛–42⅛	10.8
1983	3,535,514	163,356	3,031,311	2.1	1,255,658	165,068	1,578,875	4.7	10.5	3.41	1.75	3.8	59–33⅝	13.6
1982	3,453,674	132,127	2,985,004	2.0	1,296,204	171,047	1,526,390	3.8	8.7	2.74	1.75	5.7	37½–24⅜	11.3
1981	3,649,073	197,054	3,049,917	1.9	1,325,063	180,897	1,513,457	5.4	13.0	4.11	1.675	5.5	36½–24½	7.4
Baker Industries Corp.														
1984	$264,125	($6,842)[c]	$341,087	1.1	$178,710	$15,278	$115,622	—	—	($0.58)[c]	0.00	0.0	$11¾–5⅛	—
1983	252,730	1,001[d]	326,818	1.1	176,725	9,687	112,460	0.4%	0.9%	0.08[d]	0.00	0.0	12¼–5½	110.9
1982	210,185	(5,256)[e]	304,073	0.8	178,796	18,534	102,015	—	—	(0.44)[e]	0.00	0.0	8⅝–3⅞	—
1981	206,813	1,254[f]	342,935	1.0	189,135	65,486	115,289	0.6	1.1	0.11[f]	0.00	0.0	25–7½	147.7
Betz Laboratories														
1984	$303,888	$36,737	$220,662	2.1	$123,296	$25,302	$170,584	12.1%	21.5%	$2.33	$1.10	3.3%	$ 39–27¼	14.2
1983	266,983	33,100	204,174	2.1	110,872	32,795	161,766	12.4	20.5	2.08	0.94	2.4	44¾–32¼	18.5
1982	254,717	30,561	186,329	2.0	97,382	24,769	143,421	12.0	21.3	1.93	0.82	2.4	42⅛–24⅝	17.4
1981	252,545	28,815	165,650	2.7	71,914	16,525	126,799	11.4	22.7	1.83	0.69	2.5	33⅛–21¾	15.0

a Fiscal year ends Sept. 30. b Excludes extraordinary gain for debt-for-equity exchange of $2.8 million ($0.10 per share) and credit for cumulative effect of change in accounting principle for investment tax credit of $61.9 million ($2.16 per share). c Net loss. d Excludes extraordinary net gain on termination of pension plan of $1.8 million ($0.16 per share). e Net loss; excludes net loss from discontinued operations and their disposition of $8.0 million ($0.68 per share). f Excludes net loss from discontinued operations of $6.1 million ($0.52 per share).

Year	Net sales	Net income	Total assets	Current ratio	Net plant and equipment	Capital expenditures	Net worth	NET INCOME % of sales	NET INCOME % of net worth	NET INCOME $ per share	Dividends, $ per share	Dividend yield, % of price	Stock price range, $ per share	Price-earnings ratio
	Money figures in thousands of dollars unless otherwise indicated													
Big Three Industries														
1984	$775,678	$ 56,696	$1,152,791	2.1	$820,807	$ 96,897	$586,272	7.3%	10.0%	$1.40	$0.80	3.7%	$24⅞–19¼	15.4
1983	668,041	45,331	1,097,602	3.0	763,863	71,581	615,720	6.8	7.4	1.07	0.74	3.2	27⅜–18½	21.6
1982	767,785	86,812	1,055,313	3.0	773,777	162,293	609,792	11.3	14.2	2.05	0.72	3.3	28½–15⅛	10.8
1981	823,280	108,854	1,015,259	2.7	680,709	158,234	555,765	13.2	19.6	2.57	0.60	1.9	37⅝–25	12.2
Cabot Corp.														
1984[a]	$1,752,523	$ 97,073	$1,730,722	1.8	$1,051,251	$116,911	$699,167	5.5%	13.9%	$3.02	$0.92	3.6%	$28⅞–27⅝	8.5
1983[a]	1,558,016	64,162	1,293,340	2.6	656,894	76,964	658,838	4.1	9.7	2.00	0.92	3.6	30⅞–20½	12.8
1982[a]	1,587,658	88,007	1,300,553	2.2	664,434	138,342	624,069	5.5	14.1	2.77	0.92	4.4	25½–16⅛	7.5
1981[a]	1,622,755	110,167	1,238,729	2.2	595,234	192,348	586,226	6.8	18.8	3.50	0.86	2.9	35½–23⅞	8.5
Celanese Corp.														
1984	$3,328,000	$161,000	$3,104,000	1.6	$1,349,000	$169,000	$1,099,000	4.8%	14.6%	$10.87	$4.10	5.7%	$ 82–62¾	6.7
1983	3,261,000	112,000	2,869,000	1.7	1,445,000	105,000	1,169,000	3.4	9.6	6.89	4.00	6.4	79¾–45	9.1
1982	3,062,000	(34,000)[b]	2,862,000	1.9	1,808,000	275,000	1,131,000	...	...	(2.45)[b]	4.00	7.9	59⅞–41¼	...
1981	3,752,000	144,000	2,991,000	2.0	1,518,000	414,000	1,233,000	3.8	11.7	9.01	3.85	6.4	69¼–51⅝	6.7
Chemed Corp.														
1984	$346,140	$20,110	$180,518	1.7	$45,517	$9,198	$ 49,822	5.8%	40.4%	$2.29	$1.48	4.7%	$36⅝–25¾	13.6
1983	271,343	17,371[c]	174,248	1.9	35,012	5,703	58,420	6.4	29.7	2.17[c]	1.36	3.8	39½–32	16.4
1982	249,019	16,824[d]	152,735	1.7	30,887	5,008	36,448	6.8	46.2	1.79[d]	1.25	4.7	36–17⅞	14.9
1981	250,638	25,186[e]	216,915	2.7	29,583	5,481	168,542	10.0	14.9	1.26[e]	1.14	5.2	25–19	17.5
Crompton & Knowles Corp.														
1984	$230,434	$7,891	$114,135	2.5	$30,809	$3,917	$59,586	3.4%	13.2%	$2.31	$1.14	5.3%	$23¾–19¼	9.3
1983	230,560	6,302	115,536	2.6	31,205	2,954	57,893	2.7	10.9	1.81	1.06	4.6	28⅞–16¾	12.6
1982	213,250	5,199	117,902	2.6	33,055	3,582	59,320	2.4	8.8	1.44	1.04	6.6	19⅝–12⅛	9.1
1981	243,412	8,571	132,197	2.3	32,568	6,699	63,606	3.5	13.5	2.51	0.95	6.1	18⅛–12⅞	6.2
Dow Chemical Co.														
1984	$11,418,000	$549,000[f]	$11,217,000	1.5	$5,173,000	$ 781,000	$4,860,000	4.8%	11.3%	$2.83	$1.80	6.0%	$34½–25¾	10.6
1983	10,951,000	293,000[g]	11,785,000	1.4	5,695,000	630,000	4,851,000	2.7	6.0	1.50[g]	1.80	5.7	38⅛–25	21.1
1982	10,618,000	342,000[h]	11,612,000	1.8	5,961,000	829,000	4,845,000	3.2	7.1	1.77[h]	1.80	7.4	28⅞–19⅝	13.7
1981	11,873,000	564,000	12,268,000	1.7	6,174,000	1,176,000	4,663,000	4.8	12.1	3.00	1.80	5.8	39–23⅜	10.4
E. I. du Pont de Nemours & Co.														
1984	$35,915,000	$1,431,000	$24,098,000	1.6	$14,409,000	$2,931,000	$12,233,000	4.0%	11.7%	$5.93	$2.90	6.1%	$52⅞–42⅝	8.8
1983	35,378,000	1,127,000	24,432,000	1.7	14,261,000	2,628,000	11,472,000	3.2	9.8	4.70	2.50	5.5	55–35½	9.6
1982	33,331,000	894,000	24,343,000	1.7	14,004,000	3,295,000	10,850,000	2.7	8.2	3.75	2.40	6.5	44⅜–30	9.9
1981	22,810,000	1,081,000[i]	23,829,000	2.0	12,722,000	2,389,000	10,458,000	4.7	10.3	5.81[i]	2.75	6.0	56–35¼	7.9
Ethyl Corp.														
1984	$1,675,059	$132,184	$1,437,207	2.2	$573,156	$103,416	$707,716	7.9%	18.7%	$1.72	$0.425	3.2%	$16⅝–10	7.7
1983	1,745,193	106,038	1,449,982	2.0	626,461	84,723	811,260	6.1	13.1	1.60	0.425	3.9	14⅝–7⅛	8.4
1982	1,614,626	94,166	1,458,534	2.2	666,186	91,915	766,175	5.8	12.3	1.17	0.375	5.7	8½–4½	5.6
1981	1,757,195	90,891	1,194,630	2.2	658,282	140,520	683,001	5.2	13.3	1.14	0.375	5.3	8⅝–5⅝	6.2
Ferro Corp.														
1984	$662,867	$16,886	$359,938	2.0	$136,462	$29,364	$185,983	2.5%	9.1%	$2.53	$1.20	4.0%	$38½–22¼	12.0
1983	619,179	19,228	364,861	1.9	132,509	21,252	185,337	3.1	10.4	3.04	1.20	3.7	39⅞–24⅝	10.6
1982	595,830	10,277[j]	345,922	2.0	133,318	22,650	161,945	1.7	6.3	1.37[j]	1.20	4.9	30½–18½	17.9
1981	702,213	25,503	389,405	2.1	135,587	24,243	222,441	3.6	11.5	3.30	1.20	4.6	31½–20¾	7.9
First Mississippi Corp.														
1984[k]	$270,004	$15,845[l]	$380,855	1.5	$209,742	$41,034	$166,957	5.9%	9.5%	$0.77[l]	$0.24	2.3%	$13⅝–7¼	13.6
1983[k]	203,976	14,146	379,436	1.3	200,990	47,428	155,055	6.9	9.1	0.69	0.24	2.0	15½–8¼	17.2
1982[k]	222,977	23,212[m]	394,587	1.0	183,994	67,882	145,407	10.4	16.0	1.11[m]	0.24	2.2	16–6	9.9
1981[k]	357,697	29,704	318,925	1.5	117,244	58,277	138,384	8.3	21.5	1.38	0.23	1.2	26⅛–13⅛	14.2
W. R. Grace & Co.														
1984	$6,727,800	$195,600	$5,193,900	1.6	$2,704,200	$390,100	$2,063,300	2.9%	9.5%	$4.02	$2.80	6.7%	$46⅞–36½	10.4
1983	6,219,500	159,700[n]	4,946,600	1.6	2,715,400	353,100	2,094,300	2.6	7.6	3.29[n]	2.80	6.3	50⅜–38⅝	13.5
1982	6,127,600	319,500[o]	4,854,300	1.7	2,706,400	559,500	2,136,600	5.2	15.0	6.62[o]	2.70	7.2	46¼–28½	5.8
1981 /	6,520,800	361,300[p]	4,947,100	1.5	2,528,600	656,900	1,986,800	5.5	18.2	7.59[p]	2.45	5.0	58⅝–38½	6.5
Great Lakes Chemical Corp.														
1984	$278,235	$35,568	$276,469	2.2	$130,784	$28,770	$164,805	12.8%	21.6%	$2.38	$0.36	1.1%	$38⅝–24	13.2
1983	225,950	23,842	217,916	2.1	121,411	23,393	132,286	10.6	18.0	1.83	0.30	1.1	39¼–16⅝	17.3
1982	169,703	13,945[q]	192,127	2.2	113,659	19,143	111,782	8.2	12.5	0.98[q]	0.26	1.6	20⅛–12½	16.9
1981	150,333	18,031	170,198	1.9	98,580	22,777	106,878	12.0	16.6	1.25	0.22	0.9	29¼–19⅛	18.0

a Fiscal year ends Sept. 30. b Net loss; includes special charge related to 40% equity in Mexican affiliate of $39 million ($2.50 per share). c Excludes net gain on disposition of discontinued Dearborn Group operations of $875,000 ($0.11 per share). d Excludes net income from discontinued Dearborn Group operations of $1.9 million ($0.11 per share). e Excludes net income from discontinued Dearborn Group operations of $11.2 million ($0.56 per share). f Includes pretax gain on sales of investments of $184 million but excludes tax benefit from realization of foreign tax loss carry-forwards of $36 million ($0.19 per share). g Includes pretax gain on sales of investments of $101 million but excludes extraordinary net gain on debt-for-equity exchange of $41 million ($0.21 per share). h Includes pretax gain on sales of investments of $214 million but excludes extraordinary net gain on debt-for-equity exchange of $57 million ($0.30 per share). i Excludes cumulative effects of change in accounting for investment tax credits of $320 million ($1.74 per share). j Includes loss on divestitures of $1.9 million ($0.23 per share). k Fiscal year ends June 30. l Excludes net gain from disposal of FirstMiss subsidiary of $120,000 ($0.01 per share). m From continuing operations; excludes net loss from discontinued FirstMiss subsidiary of $6.4 million ($0.30 per share). n Includes net gains on disposal of businesses of $5.7 million. o Includes gain on restructuring Chemed Corp. of $65.1 million and net losses on disposal of business of $600,000. p Includes net gains on disposal of business of $31.1 million. q Excludes net gain on sale of real estate of $2.5 million ($0.34 per share).

Year	Net sales	Net income	Total assets	Current ratio	Net plant and equipment	Capital expenditures	Net worth	NET INCOME % of sales	NET INCOME % of net worth	NET INCOME $ per share	Dividends, $ per share	Dividend yield, % of price	Stock price range, $ per share	Price-earnings ratio
	Money figures in thousands of dollars unless otherwise indicated													
Hercules														
1984	$2,570,935	$197,185	$2,388,489	2.4	$906,031	$218,105	$1,366,911	7.7%	14.4%	$3.54	$1.48	4.5%	$ 38–27¼	9.2
1983	2,628,954	174,222	2,175,173	2.1	793,313	167,993	1,288,118	6.6	13.5	3.17	1.38	3.9	43⅛–27¼	11.1
1982	2,468,971	86,861[a]	2,001,354	2.2	923,676	164,997	1,078,911	3.5	8.1	1.97[a]	1.32	5.8	26¾–16⅞	11.6
1981	2,718,366	136,481	1,997,144	2.5	907,733	167,189	1,051,357	5.0	13.0	3.09	1.26	5.6	26⅜–18¾	7.3
International Flavors & Fragrances														
1984	$476,678	$69,242	$452,392	4.4	$140,109	$20,942	$351,183	14.5%	19.7%	$1.89	$1.08	4.1%	$29¼–22⅞	13.8
1983	460,945	68,410	458,262	3.5	139,921	26,851	344,255	14.8	19.9	1.87	1.04	3.5	35¾–23¾	15.9
1982	447,889	63,160	431,589	4.1	135,565	28,369	335,902	14.1	18.8	1.73	1.01	4.3	30–17⅝	13.7
1981	451,088	66,123	430,890	3.8	125,975	16,558	329,878	14.7	20.0	1.81	0.94	4.6	23–17⅛	11.3
International Minerals & Chemical Corp.														
1984[b]	$1,532,900	$112,000[c]	$1,965,600	1.9	$2,061,400	$104,800	$1,039,100	7.3%	10.8%	$4.17[c]	$2.60	6.4%	$ 49–32⅞	9.8
1983[b]	1,462,000	80,500	1,943,900	1.9	1,983,700	119,300	1,024,100	5.5	7.9	3.02	2.60	6.5	49–31⅜	13.3
1982[b]	1,560,400	122,300[d]	1,941,900	1.8	1,869,900	161,600	1,010,200	7.8	12.1	4.56[d]	2.60	8.6	36⅞–23½	6.6
1981[b]	1,984,900	153,800	1,975,200	1.7	1,896,300	336,600	975,300	7.7	15.8	5.63	2.46	5.1	66½–30⅝	8.6
Liquid Air Corp.														
1984	$501,735	$27,304	$549,821	1.8	$370,530	$62,461	$246,667	5.4%	11.1%	$2.07	$1.60	7.7%	$ 23–18½	10.0
1983	459,409	23,902	500,573	1.5	354,796	41,620	244,849	5.2	9.8	1.80	1.60	7.2	26¼–18½	12.4
1982	448,996	27,512	503,090	1.8	353,376	58,657	247,801	6.1	11.1	2.13	1.60	9.1	20¾–14¾	8.3
1981	427,991	31,526[e]	465,128	1.6	285,026	61,818	239,776	7.4	13.1	2.86[e]	1.55	6.7	29¾–16¾	8.1
Lubrizol Corp.														
1984[b]	$241,744	$26,349	$223,694	2.0	$45,696	$ 6,172	$129,526	10.9%	20.3%	$2.67	$0.64	1.7%	$42⅜–30⅝	13.7
1983[b]	215,892	17,128	209,387	2.2	46,789	9,955	129,419	7.9	13.2	1.72	0.56	1.5	46½–28½	21.8
1982[b]	216,450	15,778	196,069	2.4	44,083	10,824	119,752	7.3	13.2	1.59	0.56	2.3	30⅜–18⅛	15.4
1981[b]	213,912	10,377	177,099	2.8	42,792	13,201	116,999	4.9	8.9	1.05	0.56	2.3	31–18⅛	23.4
Loctite Co														
1984	$831,681	$67,731	$701,974	2.8	$251,735	$29,490	$474,343	8.1%	14.3%	$1.73	$1.12	5.2%	$24½–18¼	12.4
1983	789,546	64,744[f]	682,864	2.8	274,337	25,003	471,521	8.2	13.7	1.65[f]	1.08	4.7	27⅞–18⅛	13.9
1982	801,284	47,561	643,744	2.6	288,504	51,589	462,044	5.9	10.3	1.21	1.08	5.7	23⅜–14¼	15.7
1981	878,291	92,031	673,165	2.6	284,088	75,399	478,518	10.5	19.2	2.36	1.08	3.9	35½–20⅜	11.8
Monsanto Co.														
1984	$6,691,000	$439,000	$6,373,000	2.0	$3,374,000	$814,000	$3,634,000	6.6%	12.1%	$5.42	$2.25	4.8%	$53-⅞–40⅝	11.5
1983	6,299,000	369,000[g]	6,427,000	2.1	3,284,000	560,000	3,667,000	5.9	10.1	4.48[g]	2.075	4.4	58½–37⅛	10.6
1982	6,325,000	329,000[h]	6,077,000	2.4	3,311,000	673,000	3,490,000	5.2	[illegible]	4.10[h]	1.975	5.4	44½–28¼	8.9
1981	6,947,700	445,100[i]	6,069,200	2.2	3,163,900	667,900	3,330,200	6.4	13.4	5.75[i]	1.875	5.1	43¾–29¾	6.4
Nalco Chemical Co.														
1984	$864,303	$73,086[j]	$479,271	2.4	$205,103	$52,478	$352,120	11.0%	20.8%	$1.86[j]	$1.20	4.4%	$33¼–21	14.6
1983	659,403	71,000	489,095	2.3	191,791	40,505	350,471	10.8	20.3	1.78	1.14	3.5	37–28	18.3
1982	643,863	64,356[k]	464,868	2.2	194,450	56,241	336,488	10.0	19.1	1.62[k]	1.12	4.3	34–18	16.0
1981	666,591	81,209	466,175	2.2	176,959	59,423	335,974	12.2	24.2	2.02	1.00	4.0	29⅛–20½	12.3
Olin Corp.														
1984	$2,065,328	$88,747	$1,822,099	1.9	$860,658	$165,000	$867,307	4.3%	10.2%	$3.81	$1.365	4.7%	$33⅛–25⅛	7.7
1983	1,934,579	71,715	1,829,416	1.9	850,936	122,560	848,355	3.7	8.5	3.01	1.23	4.3	34–23	9.5
1982	1,823,137	62,800[l]	1,636,027	1.7	839,974	139,015	805,185	3.4	7.8	2.66[l]	1.20	5.7	26¼–15½	7.8
1981	2,001,346	92,836	1,618,034	1.6	844,927	186,331	793,187	4.6	11.7	3.88	1.15	4.9	27–19½	6.0
Pennwalt Corp.														
1984	$1,047,214	$45,356	$868,673	1.9	$393,765	$87,177	$485,325	4.3%	9.3%	$3.31	$2.20	6.0%	$42¼–31½	11.1
1983	976,741	44,796[m]	851,[illegible]82	2.6	348,190	69,808	458,077	4.6	9.8	3.58[m]	2.20	5.9	45⅜–29	10.4
1982	952,400	24,502[n]	737,048	1.6	342,785	76,466	346,364	2.6	7.1	2.37[n]	2.20	7.8	34⅞–21½	11.9
1981	1,056,118	36,661[o]	755,755	2.1	309,525	52,696	367,098	3.5	10.0	3.55[o]	2.20	7.1	36–26¼	8.8
Reichhold Chemicals														
1984	$801,355	$25,709	$371,819	2.0	$172,219	$24,228	$206,421	3.2%	12.5%	$3.63	$0.65	2.2%	$35⅝–23	7.5
1983	747,263	21,700	362,273	2.0	175,722	19,305	211,081	2.9	10.3	2.74	0.51	1.8	38⅞–18¼	10.4
1982	814,911	6,875[p]	364,133	2.5	159,181	20,516	200,546	0.8	3.4	0.57[p]	0.48	3.2	19⅝–10	26.0
1981	950,112	17,054[q]	405,477	2.3	173,396	15,908	206,727	1.8	8.2	2.04[q]	0.48	3.5	16–11⅛	6.6
Rohm & Haas Co.														
1984	$2,042,011	$172,219	$1,633,029	2.0	$515,945	$134,253	$965,148	8.4%	17.8%	$6.73	$1.80	2.1%	$89¼–48⅛	8.7
1983	1,875,937	137,603	1,511,244	2.7	518,360	71,534	904,393	7.3	15.2	5.33	1.50	2.5	81–37¾	11.1
1982	1,828,027	85,605[r]	1,365,163	2.5	546,623	125,927	807,853	4.7	10.6	3.32[r]	1.40	4.5	39½–22¾	9.4
1981	1,884,664	93,085[s]	1,348,627	2.4	537,489	181,635	759,911	4.9	12.2	3.61[s]	1.28	4.3	35⅞–23⅜	8.2

a Excludes extraordinary net gain on debt-for-equity exchange of $11.6 million ($0.25 per share). b Fiscal year ends June 30. c Excludes net loss from operations and disposal of discontinued methanol joint venture of $30.3 million ($1.13 per share). d From continuing operations; excludes earnings and net gain on disposal of discontinued chemical operations of $15.1 million ($0.57 per share). e Includes net gain on sale of assets, before taxes, of $1.0 million. f Includes net gain on sale of investments of $7.5 million ($0.19 per share). g Excludes extraordinary net tax benefits from utilization of ex-U.S. loss carry-forwards of $33 million ($0.40 per share). h Excludes extraordinary net gain on debt-for-equity exchange of $23 million ($0.29 per share) but includes net loss on sale of European acrylic fibers business of $18 million ($0.23 per share). i Includes net gain on sale of joint venture of $67.7 million ($0.87 per share). j Excludes net income from discontinued lead antiknock compound operations of $3.1 million ($0.08 per share). k Excludes net loss on discontinued Industrial Bio-Test Laboratories operations of $6.2 million ($0.16 per share). l Excludes special charge for DDT claims, net, of $9.5 million ($0.40 per share). m Includes gain on sale, retirement, and revaluation of assets, before taxes, of $21.7 million. n From continuing operations; excludes provision for loss on disposal of discontinued operations of $2.8 million ($0.27 per share). o From continuing operations; includes cost of shutdown of chlorine-caustic plant, before taxes, of $21.5 million but excludes net loss on operation and disposal of discontinued businesses of $11.4 million ($1.10 per share) and nonrecurring net gain from cumulative effect of change in accounting for investment credit of $16.3 million ($1.57 per share). p Excludes net loss resulting from asset redeployment/divestiture program of $2.2 million ($0.32 per share). q Excludes extraordinary net charge for settlement of litigation of $2.4 million ($0.34 per share). r Includes net gain on shutdown and disposal of assets of $10.4 million ($0.40 per share). s Includes net loss from shutdown and disposal of assets of $6.6 million ($0.25 per share).

Year	Net sales	Net income	Total assets	Current ratio	Net plant and equipment	Capital expenditures	Net worth	NET INCOME % of sales	NET INCOME % of net worth	NET INCOME $ per share	Dividends, $ per share	Dividend yield, % of price	Stock price range, $ per share	Price-earnings ratio
	Money figures in thousands of dollars unless otherwise indicated													
Stepan Co.														
1984	$234,930	$5,423[a]	$132,941	1.6	$73,261	$11,557	$47,660	2.3%	11.4%	$1.66	$0.65	3.9%	$18⅝–14½	10.0
1983	207,074	6,337	144,997	1.5	76,044	9,804	58,450	3.1	10.8	1.75	0.58	3.9	17½–12	8.4
1982	208,373	5,303	163,326	1.3	75,475	16,148	55,067	2.5	9.6	1.45	0.56	4.1	18⅛–9¼	9.4
1981	204,522	6,545[b]	176,068	1.5	67,906	12,083	53,888	3.2	12.1	1.74	0.515	3.0	21⅞–12⅝	9.8
Sun Chemical Corp.														
1984	$872,948	$25,218	$587,932	2.0	$178,292	$38,052	$174,164	2.9%	14.5%	$3.23	$0.48	1.7%	$ 33–24¼	8.9
1983	746,609	9,529	497,715	1.8	141,771	27,666	157,917	1.3	6.0	1.24	0.48	2.0	30⅜–17⅞	19.6
1982	664,257	14,871[c]	523,798	1.9	134,351	27,371	162,130	2.2	9.2	1.97[c]	0.48	2.6	24¼–13¼	9.5
1981	598,776	35,349[d]	523,282	2.1	122,397	32,706	176,601	5.9	20.0	4.73[d]	0.48	1.9	31⅞–19¼	5.4
Union Carbide Corp.														
1984	$ 9,506,000	$341,000[e]	$10,402,000	1.3	$6,383,000	$ 670,000	$4,808,000	3.6%	7.1%	$4.84[e]	$3.40	6.9%	$65¼–32¾	10.1
1983	9,001,000	218,000[f]	10,226,000	1.8	6,282,000	761,000	4,860,000	2.4	4.5	3.11[f]	3.40	5.4	73⅞–51	20.1
1982	9,061,000	310,000	10,552,000	1.4	6,356,000	1,179,000	5,095,000	3.4	6.1	4.47	3.40	6.7	61–40⅛	11.3
1981	10,168,000	649,000	10,366,000	2.1	5,794,000	1,186,000	5,206,000	6.4	12.5	9.56	3.30	6.1	62⅛–45¼	5.6
Williams Cos.														
1984	$3,388,700	$144,500[g]	$4,534,000	1.0	$3,252,800	$252,000	$1,284,000	4.3%	11.3%	$4.21	$1.25	4.6%	$31½–23	6.5
1983	2,167,000	54,000	4,686,400	0.7	3,193,000	253,400	1,173,900	2.5	4.6	1.79	1.20	5.1	30⅛–16¾	13.1
1982	1,691,315	29,682[h]	2,369,791	1.7	1,513,712	171,895	1,029,411	1.8	2.9	1.00[h]	1.20	5.6	29⅜–13⅛	21.2
1981	1,976,336	99,157[i]	2,445,877	1.6	1,497,797	233,184	1,027,245	5.0	9.7	3.32[i]	1.20	3.4	46⅝–23½	10.6
Witco Chemical Corp.														
1984	$1,495,831	$62,602	$739,488	2.2	$348,740	$65,720	$358,497	4.2%	17.5%	$4.28	$1.40	4.2%	$39½–27⅝	7.8
1983	1,385,744	52,022	715,472	2.1	313,794	44,901	319,334	3.8	16.3	3.60	1.26	4.6	37¼–17⅞	7.6
1982	1,305,418	29,842	643,911	2.2	291,914	54,130	281,013	2.3	10.6	2.10	1.20	7.2	19⅝–13¾	8.0
1981	1,291,878	38,580	707,181	1.7	281,945	55,479	277,973	3.0	13.9	2.76	1.10	6.1	21–15⅛	6.6
PHARMACEUTICALS														
Abbott Laboratories														
1984	$3,103,962	$402,575	$3,172,897	1.7	$1,236,572	$334,800	$1,602,700	13.0%	25.1%	$3.34	$1.20	2.8%	$48¾–36¾	12.8
1983	2,927,873	347,617	2,824,128	1.7	1,069,200	311,800	1,417,883	11.9	24.5	2.86	1.00	2.2	53⅜–36⅛	15.6
1982	2,602,447	289,123	2,566,909	1.1	901,059	266,600	1,310,886	11.1	22.1	2.37	0.84	2.5	41¼–25⅜	14.1
1981	2,342,524	247,283	2,355,613	1.1	729,402	212,400	1,152,050	10.6	21.5	2.01	0.72	2.6	32¼–23⅝	13.9
American Home Products Corp.														
1984	$4,485,470	$655,828[j]	$2,849,732	3.3	$709,623	$141,891	$1,905,733	14.6%	34.4%	$4.26[j]	$2.64	5.2%	$55¾–46¾	12.0
1983	4,856,501	627,233	2,864,104	2.9	812,370	204,680	1,826,964	12.9	34.3	4.00	2.40	5.0	54¼–41⅝	12.0
1982	4,582,096	560,103	2,602,346	2.6	725,352	153,812	1,614,192	12.2	34.7	3.59	2.15	5.3	48–33¼	11.3
1981	4,131,237	497,332	2,517,541	3.0	492,879	99,852	1,583,475	12.0	31.4	3.18	1.90	5.8	37¼–28⅛	10.3
Baxter Travenol Laboratories														
1984	$1,800,422	$145,147[k]	$2,000,753	1.5	$767,636	$171,852	$1,106,731	8.1%	13.1%	$1.03	$0.33	1.8%	$24⅞–11¾	17.8
1983	1,842,544	218,055	2,127,037	1.6	746,304	192,464	1,151,109	11.8	18.9	1.54	0.28	1.1	31⅛–20	16.6
1982	1,671,445	186,885	1,792,710	1.9	628,720	148,812	1,061,009	11.2	17.6	1.32	0.23	1.1	25½–15⅛	15.4
1981	1,583,890	150,581	1,590,743	2.6	583,084	87,101	978,325	10.0	15.4	1.07	0.19	1.3	16⅞–12	13.4
Bristol-Myers Co.														
1984	$4,189,400	$472,400	$3,100,800	2.4	$791,100	$191,600	$1,998,100	11.3%	23.6%	$3.45	$1.50	3.2%	$52⅝–41	13.6
1983	3,917,000	408,000	2,888,300	2.2	701,700	165,000	1,788,900	10.4	22.8	3.00	1.16	2.9	47⅞–31¼	13.2
1982	3,599,900	348,700	2,665,800	2.2	653,600	170,000	1,624,000	9.7	21.5	2.59	1.02	3.3	37–25⅝	12.0
1981	3,496,700	305,800	2,406,000	2.2	581,800	159,300	1,482,000	8.7	20.6	2.29	0.89	3.4	29⅝–22⅛	11.4
Eli Lilly & Co.														
1984	$3,109,200	$490,200	$3,556,500	1.8	$1,280,400	$205,300	$2,133,800	15.8%	23.0%	$6.73	$2.975	4.9%	$67⅝–53	9.0
1983	3,033,700	457,400	3,401,200	1.7	1,212,600	199,900	2,108,400	15.1	21.6	6.13	2.75	4.4	68⅜–56½	10.2
1982	2,962,711	411,828	3,155,125	1.8	1,135,575	236,642	2,055,460	13.9	20.0	5.42	2.60	4.7	65¼–45⅛	10.2
1981	2,773,295	374,478	2,902,252	1.9	1,006,100	253,735	1,888,200	13.5	19.8	4.93	2.375	4.2	68⅜–45¼	11.6

a Includes nonrecurring net loss on writedown of equipment of $2.6 million. b Includes loss of sale of flavor compounding business, before taxes, of $890,000. c From continuing operations; excludes equity in net loss of affiliate's discontinued operations of $12.9 million ($1.71 per share). d From continuing operations; includes gains on disposition of product lines of $8.4 million but excludes equity in net loss of affiliate's discontinued operations of $9.4 million ($1.26 per share). e Excludes extraordinary charge relating to accident in Bhopal, India, of $18 million ($0.25 per share). f Excludes nonrecurring net charge for closing of facilities of $139 million ($1.98 per share). g Excludes net loss and net gain on disposition of Edgcomb Metals Co. operations of $5.0 million ($0.15 per share). h From continuing operations; excludes net income from discontinued operations of $4.7 million ($0.15 per share). i From continuing operations; excludes net income from discontinued operations of $10.4 million ($0.35 per share). j From continuing operations; excludes net income and net gain on sale of discontinued businesses of $76.3 million ($0.50 per share). k Excludes special net charge for closing three plants and revaluation of assets of $116.1 million ($0.82 per share).

2 Finances of the U.S. Chemical Industry

Year	Net sales	Net income	Total assets	Current ratio	Net plant and equipment	Capital expenditures	Net worth	NET INCOME % of sales	NET INCOME % of net worth	NET INCOME $ per share	Dividends, $ per share	Dividend yield, % of price	Stock price range, $ per share	Price-earnings ratio
	Money figures in thousands of dollars unless otherwise indicated													
Merck & Co.														
1984	$3,559,685	$492,967	$4,489,097	1.9	$1,912,778	$274,425	$2,443,260	13.8%	20.2%	$5.71	$3.00	3.4%	$ 97½–78¼	13.1
1983	3,246,139	450,855	4,119,098	1.7	1,715,207	272,756	2,339,013	13.9	19.3	5.10	2.80	3.0	104⅝–81¾	15.3
1982	3,063,017	415,137	3,591,652	1.9	1,557,490	295,106	2,147,988	13.6	19.3	5.61	2.80	3.7	88¼–64	13.6
1981	2,929,455	398,265	3,310,000	1.7	1,395,567	322,814	2,001,460	13.6	19.9	5.36	2.60	2.9	103–76¼	16.7
Pfizer														
1984	$3,854,500	$507,900	$3,927,700	2.1	$1,155,600	$144,000	$2,365,100	13.2%	21.5%	$3.08	$1.32	3.7%	$42⅜–29⅜	11.6
1983	3,750,000	447,100	3,830,000	2.0	1,157,000	214,900	2,074,700	11.9	21.6	2.73	1.16	3.0	44¾–33⅝	14.4
1982	3,453,600	332,800	3,644,500	1.9	1,124,700	265,500	1,869,500	9.6	17.8	2.13	0.92	2.8	40⅜–25	15.3
1981	3,249,700	273,700[a]	3,544,200	1.9	998,200	287,100	1,594,700	8.4	17.2	1.82[a]	0.80	3.4	27½–20	13.1
Richardson-Vicks														
1984[b]	$1,280,500	$71,900	$733,100	2.1	$231,600	$27,400	$281,600	5.6%	25.5%	$2.92	$1.48	5.4%	$30⅛–24¼	9.3
1983[b]	1,115,700	51,400	755,000	1.8	241,600	34,030	264,900	4.6	19.4	2.10	1.48	5.6	29⅞–23⅜	12.7
1982[b]	1,115,600	66,900	687,100	2.0	247,000	57,500	394,600	6.0	17.0	2.74	1.48	5.6	32½–20½	9.7
1981[b]	1,088,100	83,200[c]	672,200	1.7	208,600	49,300	365,300	7.6	22.8	3.47[c]	1.32	4.7	34¾–21¾	8.1
A. H. Robins Co.														
1984	$631,891	($461,613)[d]	$565,627	1.5	$135,685	$38,155	($210,353)[e]	—	—	($18.44)[d]	$0.72	4.1%	$23¼–12⅛	—
1983	563,510	58,221[f]	459,462	3.1	107,651	20,955	305,636	10.3%	19.0%	2.40	0.62	2.7	29⅞–16	9.5
1982	482,324	48,693[g]	386,843	3.8	98,079	15,815	267,945	10.1	18.2	1.98	0.52	3.3	20⅛–11¼	7.9
1981	450,854	44,228[h]	385,483	3.0	96,457	28,103	251,742	9.8	17.6	1.77	0.44	3.8	14¾–8½	6.6
Schering-Plough Corp.														
1984	$1,674,300	$177,200	$2,436,200	1.2	$912,400	$173,700	$1,235,100	9.5%	14.3%	$3.50	$1.68	4.6%	$ 40–323	10.4
1983	1,808,500	178,500[i]	2,309,800	1.3	841,400	177,700	1,186,500	9.9	15.0	3.40[i]	1.68	4.0	48⅛–36¾	12.5
1982	1,817,900	183,500	2,341,200	1.8	747,500	180,400	1,278,500	10.1	14.4	3.39	1.68	4.8	43¾–26¼	10.3
1981	1,808,800	179,300	2,214,500	1.9	654,600	170,300	1,254,200	9.9	14.3	3.31	1.66	4.9	42½–24⅞	10.2
G. D. Searle & Co.														
1984	$1,245,600	$161,600[j]	$1,582,000	2.0	$496,400	$191,900	$803,000	13.0%	20.1%	$3.24	$0.52	1.0%	$65½–37½	15.9
1983	946,000	119,000[k]	1,278,100	2.3	361,900	124,800	668,100	12.6	17.8	2.39[k]	0.52	1.1	55⅞–34¾	19.0
1982	1,036,900	140,400	1,204,500	2.1	377,800	135,200	599,700	13.5	23.4	2.77	0.52	1.4	45¼–28⅝	13.3
1981	942,300	130,900[l]	1,050,400	2.3	279,300	87,600	533,600	13.9	24.5	2.52[l]	0.52	1.7	35½–25⅛	12.0
SmithKline [illegible] Corp.														
1984	[illegible]	$500,300[m]	$3,077,600	2.0	$1,093,000	$241,500	$1,952,100	17.0%	25.6%	$6.19[m]	$2.80	5.1%	$60¼–50	8.9
1983	[illegible]	485,990[n]	3,085,409	1.8	988,857	232,914	1,970,793	17.1	24.7	5.85[n]	2.65	4.0	76½–55¼	11.3
1982	2,900,967	455,157	2,765,900	2.1	971,302	304,784	1,749,407	15.3	26.0	5.51	2.39	3.5	77⅝–57⅜	12.3
1981	1,985,341	370,000	1,796,105	2.3	580,920	200,816	1,138,457	18.6	32.5	5.55	2.12	2.8	88⅜–63⅞	13.7
Squibb Corp.														
1984	$1,886,037	$197,172	$2,072,188	2.1	$617,724	$115,629	$1,286,517	10.5%	15.6%	$3.68	$1.48	3.2%	$54¾–37½	12.5
1983	1,768,891	173,274[o]	1,887,783	2.2	564,613	109,800	1,173,399	9.8	14.8	3.31[o]	1.365	2.8	55½–42⅞	14.9
1982	1,660,766	153,636	1,871,882	2.1	511,821	87,280	1,037,989	9.3	14.8	3.01	1.28	3.2	50½–29	13.2
1981	1,523,911	41,098[p]	1,900,424	2.1	479,720	69,851	979,689	2.7	4.2	0.83[p]	1.215	3.8	37⅝–26⅝	38.7
Sterling Drug														
1984	$1,827,295	$144,853[q]	$1,429,618	2.5	$370,273	$73,158	$894,943	7.9%	16.2%	$2.39[q]	$1.15	4.3%	$ 30–23½	11.2
1983	1,901,171	136,844	1,437,440	2.5	366,328	63,189	879,655	7.2	15.6	2.24	1.11	4.3	29⅝–22⅛	11.6
1982	1,796,153	131,970	1,297,989	2.6	356,535	80,068	825,944	7.3	16.0	2.17	1.06	4.3	29¼–19¾	11.4
1981	1,792,925	130,303	1,226,410	2.5	334,980	77,016	787,542	7.3	16.5	2.15	0.98	4.3	26⅛–19	10.5
Upjohn Co.														
1984	$2,179,060	$173,272	$2,248,363	1.5	$809,534	$136,738	$1,134,154	8.0%	15.3%	$5.67	$2.56	4.4%	$72⅛–45	10.3
1983	1,986,106	160,225	2,195,048	1.9	754,954	155,016	1,057,288	8.1	15.2	5.28	2.35	4.1	68¾–46⅛	10.9
1982	1,828,730	126,020	2,013,985	1.9	675,869	137,273	973,028	6.9	13.0	4.18	2.28	4.7	59¾–38	11.6
1981	1,898,334	181,764	1,940,485	2.0	614,481	139,211	965,267	9.6	18.8	6.04	2.07	3.6	69–45⅝	9.5
Warner-Lambert Co.														
1984	$3,166,657	$223,887	$2,377,098	1.5	$863,179	$142,461	$ 910,125	7.1%	24.6%	$2.81	$1.48	4.6%	$36⅛–28¾	11.5
1983	3,108,325	200,496	2,368,879	1.7	826,232	165,854	869,980	6.5	23.0	2.51	1.42	4.7	35–25¾	12.1
1982	3,245,967	174,970[r]	2,344,259	1.9	768,571	153,507	815,864	5.4	21.4	2.20[r]	1.40	5.6	30⅛–19⅝	11.3
1981	3,379,952	9,222[s]	2,662,418	1.7	869,753	165,833	1,084,796	0.3	0.9	0.12[s]	1.34	6.4	25–17⅛	175.5

a From continuing operations; excludes net loss from discontinued diagnostic imaging operations and provision for loss on disposal of discontinued operations of $52.4 million ($0.34 per share). b Fiscal year ends June 30. c From continuing operations; excludes net loss from discontinued ethical pharmaceutical businesses of $3.9 million ($0.16 per share). d Net loss; includes income, before taxes, from litigation settlement of $1.2 million and net charge for reserve for Dalkon Shield claims of $489.1 million ($19.53 per share). e Deficit. f Includes income, before taxes, from litigation settlement of $2.3 million. g Includes income, before taxes, from litigation settlement of $3.1 million. h Includes income, before taxes, from litigation settlement of $3.4 million. i From continuing operations; excludes net gain on sale of discontinued home products business of $11.6 million ($0.22 per share). j Includes gain, before taxes, on sale of Pearl Health Services shares of $6.1 million. k From continuing operations; includes gain, before taxes, on sale of Pearl Health Services shares of $39.0 million but excludes net income and gain on sale of discontinued specialty gas and Australian specialty chemical operations of $32.2 million ($0.65 per share). l From continuing operations; excludes net loss from operations and disposition of discontinued businesses of $26.0 million ($0.50 per share) and debit for cumulative effect of changes in accounting principles of $6.2 million ($0.12 per share). m Excludes net gain on sale of Industrial Business Group of $3.3 million ($0.04 per share). n From continuing operations; excludes net income of discontinued Industrial Business Group of $3.5 million ($0.04 per share). o Excludes extraordinary net gain on early extinguishment of debt of $27.0 million ($0.52 per share) and net loss on disposal of Latin American operations of $27.6 million ($0.53 per share). p From continuing operations; excludes net gain on sale of confectionery products business of $58.1 million ($1.16 per share), net income from that business of $12.2 million ($0.24 per share), and extraordinary charge relating to takeover of operations in Iran of $6.5 million ($0.13 per share). q From continuing operations; excludes net loss on operations of divested environmental control business of $1.5 million ($0.02 per share). r Includes nonrecurring net credit of $12 million ($0.15 per share). s Includes nonrecurring net charge of $134 million ($1.68 per share).

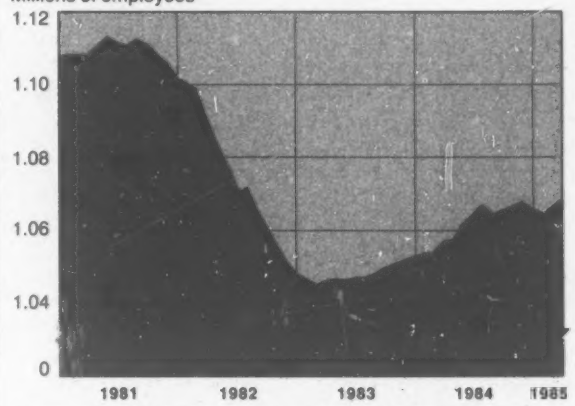
Chemical workforce growing sluggishly

Although in 1984 the number of workers in the U.S. chemical industry increased to about 1,061,000, the workforce remains significantly smaller than when it began to drop precipitously in late 1981. Moreover, the slow but steady recovery in jobs that started in mid-1983 flattened out by mid-1984. Employment in the petroleum industry continued to drop last year, but rubber manufacturers added workers.

No segment of the chemical industry cut employees in 1984, but rebuilding is fastest in such product areas as drugs, soap, toiletries, paint, and miscellaneous chemical products, where the number of workers has rebounded to the level of 1982. The industrial and agricultural chemicals sectors have shown little or no increase in their workforces in the past year, however.

Major chemical firms as a whole added employees in 1984 after three years of decline. However, some of the largest—such as Union Carbide, Monsanto, and Dow Chemical—continued to trim employment.

Chemical employment continues slow recovery from 1983 lows



a Seasonally adjusted employment in U.S. chemicals and allied products industry; March and April 1985 figures are preliminary. **Source:** Department of Labor

INDUSTRIAL EMPLOYMENT: Higher last year in chemicals, but under 1982 level

	All employees[a] (thousands)				Production workers[a] (thousands)				Workweek[a,b] (hours)			
	1984	1983	1982	1974	1984	1983	1982	1974	1984	1983	1982	1974
All manufacturing	19,590	18,497	18,781	20,077	13,455	12,581	12,742	14,638	40.7	40.1	38.9	40.0
Chemicals and allied products	1,061	1,047	1,075	1,060	589	581	599	623	41.9	41.6	40.9	41.5
Industrial inorganic chemicals	157	155	161	149	80	79	86	92	42.2	41.5	40.4	42.4
Plastics materials and synthetics	176	176	185	248	116	114	119	163	42.3	42.0	40.6	41.2
Drugs	201	200	199	168	94	98	98	86	40.7	41.0	41.1	41.3
Soap, cleaners, and toilet goods	148	143	144	125	94	90	90	74	41.4	41.1	40.6	40.5
Paints and allied products	62	60	60	67	30	29	29	37	41.7	41.0	39.6	40.5
Industrial organic chemicals	163	163	171	150	83	84	86	76	43.0	42.5	41.9	42.7
Agricultural chemicals	61	61	65	62	38	37	40	40	42.8	42.1	42.0	42.5
Miscellaneous chemical products	94	90	91	91	54	51	51	55	41.8	41.3	40.5	41.0
Petroleum and coal products	188	196	201	197	110	118	120	126	43.7	43.9	43.9	42.1
Rubber and miscellaneous plastics products	796	718	697	695	621	556	534	545	41.7	41.2	39.6	40.5

a Domestic employment. b Workweek of production or nonsupervisory workers. **Source:** Department of Labor

EMPLOYMENT OF SCIENTISTS, ENGINEERS: Growth in chemical sector is slowing

Thousands[a]	1984[b]	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
Total, all industry	537.8	522.1	509.8	487.8	450.6	423.9	404.4	382.8	364.4	363.3	360.0
Chemicals and allied products	67.5	66.0	61.6	54.7	51.4	50.0	48.3	46.4	44.4	45.2	41.6
Industrial chemicals	26.7	27.2	25.9	21.6	20.9	21.4	21.3	20.6	20.1	21.1	19.1
Drugs and medicines	30.3	28.2	25.6	23.3	21.6	20.8	19.5	17.8	16.6	15.6	14.0
Other chemicals	10.5	10.6	10.1	9.8	8.9	7.8	7.5	8.0	7.8	8.5	8.7
Petroleum refining	13.4	14.7	15.6	13.0	10.8	10.1	9.9	8.9	8.6	8.4	8.2
Rubber products	na	na	8.1	10.3	na	8.1	7.9	9.1	8.6	8.4	7.7

a Full-time equivalent number of R&D scientists and engineers in industry, as of January of each year. b Preliminary. na = not available separately, but included in total. **Source:** National Science Foundation

CHEMICAL EMPLOYMENT: Up slightly last year after three years of decline

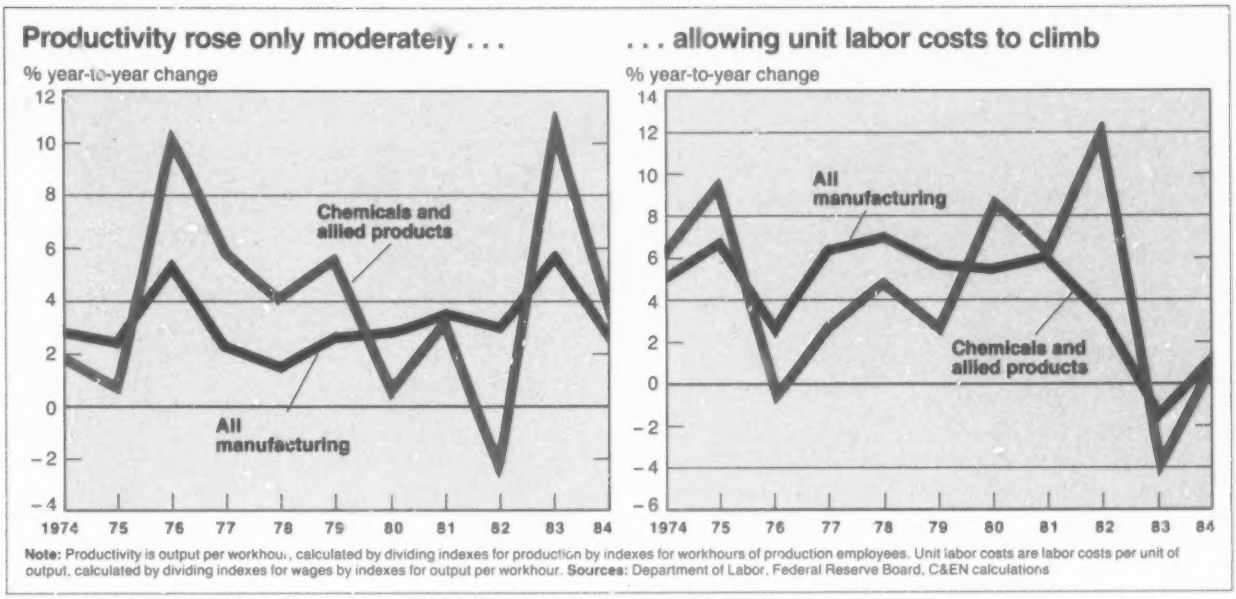
Thousands	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975
Air Products	17.7	16.7	18.9	16.2	15.8	14.6	14.3	13.7	13.4	13.0
American Cyanamid	39.2	38.7	40.2	41.8	42.6	44.2	44.0	43.8	39.4	37.8
Celanese	36.0	23.3	25.3	35.9	36.5	33.3	33.2	32.1	31.9	37.0
Crompton & Knowles	2.3	2.4	2.3	2.5	2.8	3.0	3.2	3.1	3.0	2.2
Dow Chemical	49.8	54.5	56.6	63.8	56.8	55.9	53.5	53.2	53.0	53.0
Ethyl	11.0	13.0	14.0	14.5	15.0	16.0	16.5	16.0	16.0	17.0
Freeport-McMoRan	4.8	4.8	5.0	5.2	2.7	3.9	3.5	3.7	3.8	3.5
H. B. Fuller	4.3	4.1	4.0	3.3	3.4	3.4	3.3	3.0	2.8	2.6
W. R. Grace	80.0	78.5	82.2	89.0	91.7	82.1	68.5	68.7	63.8	65.3
Hercules	26.3	24.2	24.5	22.8	22.9	24.4	24.5	24.0	24.0	23.5
International Flavors	3.7	3.7	3.6	3.6	3.6	3.6	3.5	3.3	3.1	2.9
International Minerals	9.0	8.4	8.4	10.6	10.6	10.3	9.9	9.9	9.7	10.5
Lubrizol	4.2	4.2	4.3	4.2	4.2	3.9	3.8	3.6	3.6	3.6
Monsanto	50.8	50.9	51.2	57.4	61.8	63.9	62.9	61.5	61.9	59.2
Nalco Chemical	4.8	4.6	4.6	4.7	4.4	4.1	4.1	4.2	3.8	3.5
Olin	17.8	18.2	17.5	20.3	21.0	21.7	22.7	22.4	22.0	23.0
Pennwalt	9.8	9.8	9.5	10.7	12.8	13.3	14.0	13.9	13.9	14.3
PPG Industries	37.7	37.0	37.0	36.6	37.3	38.2	37.4	36.6	36.3	34.9
Reichhold Chemicals	4.2	3.6	4.5	5.6	5.6	6.4	6.5	6.5	5.8	4.3
Rohm & Haas	11.9	11.4	11.5	13.5	13.2	13.3	13.1	13.0	13.3	13.8
Stauffer Chemical	11.7	9.7	11.0	12.2	13.4	13.8	13.1	13.0	13.0	13.1
Stepan	0.9	0.9	0.9	0.9	0.8	0.9	0.8	0.8	0.7	0.7
Union Carbide	98.4	99.5	103.2	110.3	116.1	115.8	113.4	113.7	113.1	106.5
TOTAL EMPLOYEES	535.3	522.0	540.3	585.6	595.0	590.0	569.7	563.7	551.3	545.2
ANNUAL CHANGE	2.5%	−3.4%	−7.7%	−1.6%	0.8%	3.6%	1.1%	2.2%	1.1%	−4.0%
SALES PER EMPLOYEE ($ thousands, current)	$122.3	$116.6	$110.7	$110.9	$103.5	$95.8	$91.1	$74.7	$68.8	$51.3
SALES PER EMPLOYEE ($ thousands, constant 1972[a])	$ 42.4	$ 41.5	$ 39.5	$ 40.2	$ 41.4	$44.9	$47.8	$40.4	$38.3	$29.5

a Based on producer price index for chemicals and allied products. **Note:** Data are not restated for acquisitions and similar adjustments.

WAGES: Increases in 1984 for chemical workers outpaced those for all industry

	Hourly earnings[a]				Weekly earnings[a]			
	1984	1983	1982	1974	1984	1983	1982	1974
All manufacturing	$ 9.17	$ 8.83	$ 8.49	$4.42	$373.22	$354.08	$330.26	$176.80
Chemicals and allied products	11.11	10.59	9.96	4.88	465.51	440.54	407.36	202.52
Industrial inorganic chemicals	12.34	11.68	11.01	5.27	520.75	484.72	444.80	217.65
Plastics materials and synthetics	11.15	10.56	9.87	4.70	471.65	443.52	400.72	193.64
Drugs	10.24	9.72	9.08	4.70	416.77	398.52	373.19	194.11
Soap, cleaners, and toilet goods	9.93	9.66	9.12	4.75	411.10	397.03	370.27	192.38
Paints and allied products	9.74	9.33	8.80	4.55	406.16	382.53	348.48	184.28
Industrial organic chemicals	13.42	12.73	11.85	5.62	577.06	541.03	496.52	239.97
Agricultural chemicals	10.73	10.24	9.69	4.41	459.24	431.10	406.98	187.43
Miscellaneous chemical products	10.08	9.63	9.22	4.65	421.34	397.72	373.41	190.65
Petroleum and coal products	13.45	13.29	12.46	5.68	587.77	583.43	546.99	239.13
Rubber and miscellaneous plastics products	8.27	7.99	7.64	4.06	344.86	329.19	302.54	164.43

a For production and nonsupervisory workers in domestic employment. **Source:** Department of Labor


Productivity rose only moderately . . .
% year-to-year change
Chemicals and allied products
All manufacturing
. . . allowing unit labor costs to climb
% year-to-year change
All manufacturing
Chemicals and allied products
1974 75 76 77 78 79 80 81 82 83 84

Note: Productivity is output per workhour, calculated by dividing indexes for production by indexes for workhours of production employees. Unit labor costs are labor costs per unit of output, calculated by dividing indexes for wages by indexes for output per workhour. **Sources:** Department of Labor, Federal Reserve Board, C&EN calculations

Following a pattern typical for the second year after the end of a recession, chemical productivity improved less in 1984 than in the previous year. In 1983, according to government statistics, production grew nearly 10% at the same time that total workhours decreased 1%, leading to a strong rise in productivity. Last year, by contrast, production of chemicals and allied products increased just 6%, and workhours reversed a two-year decline. The result: Productivity rose 4% compared to 11% in 1983.

Producers of chemicals and allied products were able to hold labor costs in check, nevertheless. Hourly production wages jumped 5% in 1984, compared with 6% the year before. Still, because of the smaller gain for productivity, unit labor costs edged up 1%.

Chemical sector productivity fared better than that for all manufacturing, however. With an 11% increase in output and an 8% rise in total workhours, manufacturing productivity was up less than 3% in 1984. On the other hand, wages paid to production workers in manufacturing as a whole were up less—under 4%—than in chemicals and allied products. As a consequence, labor costs per unit of output for all manufacturing increased only a bit more than in the chemical industry.

PRODUCTIVITY: Smaller improvement last year than in 1983

Indexes, 1977 = 100	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
CHEMICALS & ALLIED PRODUCTS											
Production	122.9	115.8	105.6	116.1	111.3	113.3	106.3	100.0	92.0	79.3	85.8
Workhours	96.0	93.9	95.2	101.7	100.9	103.1	102.2	100.0	97.3	92.6	100.9
Productivity	128.0	123.3	110.9	114.2	110.3	109.9	104.0	100.0	94.6	85.6	85.1
Hourly production wages	172.8	164.7	154.9	141.8	129.1	118.2	109.2	100.0	91.9	83.8	75.9
Unit labor costs	135.0	133.6	139.6	124.2	117.1	107.6	105.0	100.0	97.2	97.9	89.2
ALL MANUFACTURING											
Production	119.1	107.1	99.4	108.7	105.9	110.7	106.1	100.0	94.1	84.0	93.5
Workhours	96.0	88.6	87.0	97.9	98.9	106.2	104.5	100.0	96.1	90.4	103.0
Productivity	124.0	120.9	114.3	111.0	107.1	104.2	101.5	100.0	97.9	92.9	90.8
Hourly production wages	161.4	155.5	149.5	140.7	128.0	118.0	108.6	100.0	91.9	85.0	77.8
Unit labor costs	130.2	128.6	130.8	126.7	119.5	113.2	107.0	100.0	93.8	91.5	85.7

Sources: Department of Labor, Federal Reserve Board, C&EN calculations

World chemical trade climbs to new record

World chemical trade, measured as exports, grew an impressive 14% to an estimated $160 billion last year. That surpasses by a sizable margin the old record of $147 billion set in 1980. U.S. chemical producers shared in the feast. Their shipments to foreign markets increased 13% to $22.3 billion.

But it was U.S. imports of chemicals that contributed more than exports to the new trade record. Last year was a rerun of 1983—a healthy U.S. economy acting like a magnet for imports and a too-strong U.S. dollar making it easier for those imports to compete with domestic products.

U.S. chemical imports soared 27% last year—more than twice the rate of gain for exports—to $13.7 billion. Even on an absolute dollar basis, imports increased more than exports. Largely as a result of the attractive U.S. market, major foreign chemical exporters were able to turn in impressive performances: For Italy, chemical exports were up 25%, West Germany was ahead 18%, France up almost 20%. It's no surprise, then, that Western Europe, on average, increased chemical shipments to the U.S. 27% to $6.4 billion.

Other areas got even fatter on the U.S. market. Canada, for instance, raised its exports to the U.S. 31%. And chemical producers in the developing areas of Asia and Latin America also increased exports to the U.S. more than 30%.

As a result, the U.S. chemical trade surplus took another beating in 1984. Following eight successive years of increases, the chemical surplus declined for the fourth year in a row—to $8.6 billion. That's a 29% slide from its record level of $12.1 billion in 1980.

Despite all this, the U.S. chemical industry fared better in the trade sweepstakes than U.S. industry overall. With total imports up 26% and exports advancing only an anemic 8%, the U.S. trade deficit exploded from 1983's $57.5 billion to a worrisome $108 billion. The gap continues to widen, moreover, so far this year.

U.S. TOTAL TRADE BALANCE: The deficit nearly doubles in 1984

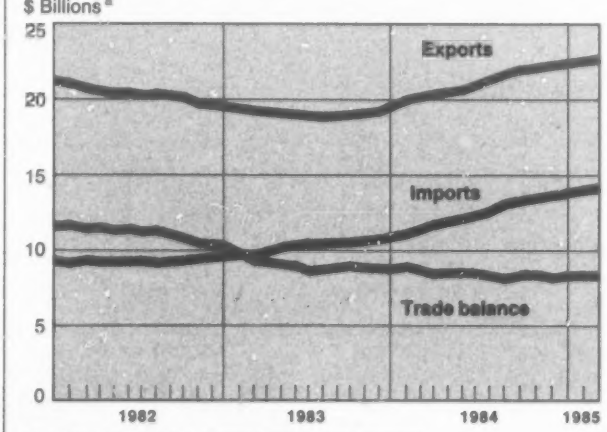
$ Billions	1984	1983	1982	1974
Total exports	$217.9	$200.5	$212.2	$ 97.9
Total imports	325.7	258.0	244.0	100.3
Trade balance	−107.8	−57.5	−31.8	−2.4

Source: Department of Commerce

U.S. CHEMICAL TRADE BALANCE: The surplus continues to shrink

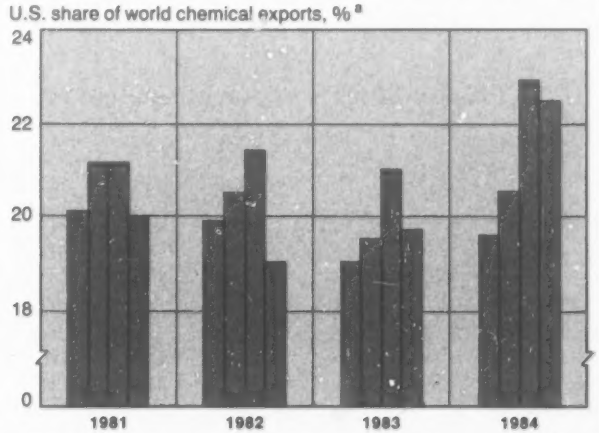
$ Millions	1984	1983	1982	1981
Chemical exports	$22,336	$19,751	$19,891	$8822
Chemical imports	13,697	10,779	9,494	4018
Trade balance	8,639	8,972	10,397	4804

Chemical exports and imports both rise . . .



a Running 12-month totals. **Source:** Department of Commerce

. . . and U.S. share of world markets widens



a U.S. chemical exports as a percentage of chemical exports from 15 major industrial nations, excluding shipments to the U.S. **Note:** Fourth-quarter 1984 is estimated. **Source:** Department of Commerce

WORLD TRADE: Expansion for chemicals

$ Millions	1984	1983	1982	1974
CHEMICAL EXPORTS				
World	$160,000[a]	$140,000[a]	$135,963	$63,995
U.S.	22,336	19,751	19,891	8,822
Canada	4,092	3,645	3,406	1,069
EC, 10 countries	83,073[a]	70,104	67,598	35,830
Belgium-Luxembourg	7,304[a]	6,216	6,173	3,649
France	14,139[a]	11,842	11,708	5,434
Italy	7,682[a]	6,116	5,296	3,127
Netherlands	12,274[a]	10,536	9,982	5,706
U.K.	12,212[a]	10,491	10,687	5,027
West Germany	26,207[a]	22,209	21,185	12,133
Switzerland	5,523	5,539	5,440	2,680
Japan	7,265	6,983	6,365	4,059
CHEMICAL IMPORTS				
U.S.	13,697	10,779	9,494	4,018
Canada	4,023	4,052	3,310	1,857
EC, 10 countries	61,967[a]	51,382	50,226	23,962
Belgium-Luxembourg	6,293[a]	5,184	5,143	2,754
France	11,335[a]	9,533	9,898	4,690
Italy	8,834[a]	7,307	6,890	3,276
Netherlands	7,061[a]	5,534	5,473	2,972
U.K.	9,332[a]	7,764	7,318	3,636
West Germany	14,780[a]	12,494	12,031	5,201
Switzerland	3,432	3,315	3,208	1,708
Japan	8,346	7,207	6,824	2,668

a C&EN estimates. **Sources:** United Nations, Organization for Economic Cooperation & Development, European Communities, individual country agencies

U.S. TRADE: Asia becomes a growth market

$ Millions	1984	1983	1982	1974
U.S. CHEMICAL EXPORTS				
Canada	$ 2,752	$ 2,546	$ 2,183	$1213
Western Europe	6,497	5,892	5,940	2665
Eastern Europe	275	306	366	54
Communist Asia	645	353	497	10
Japan	2,961	2,607	2,530	766
Rest of Asia	3,292	2,859	2,600	936
Middle East	429	423	533	181
Latin America	3,827	3,273	3,670	2245
Australasia	842	696	655	351
Africa	510	492	524	270
Other	306	304	393	131
TOTAL	**$22,336**	**$19,751**	**$19,891**	**$8822**
U.S. CHEMICAL IMPORTS				
Canada	$ 3,131	$ 2,390	$2,596	$ 837
Western Europe	6,392	5,020	4,174	1960
Eastern Europe	325	197	151	42
Communist Asia	157	131	136	18
Japan	1,312	1,099	879	486
Rest of Asia	377	283	220	80
Middle East	124	113	99	16
Latin America	1,208	924	613	219
Australasia	251	234	286	196
Africa	196	227	225	28
Other	224	161	115	136
TOTAL	**$13,697**	**$10,779**	**$9,494**	**$4018**

Source: Department of Commerce

U.S. TRADE, BY PRODUCTS: All major product categories contribute to surge in exports

$ Millions	Chemical exports				Chemical imports			
	1984	1983	1982	1974	1984	1983	1982	1974
Organic chemicals	$ 6,093	$ 5,326	$ 5,440	$2652	$ 4,265	$ 3,477	$2960	$1373
Inorganic chemicals	2,184	1,838	1,969	836	2,064	1,615	1502	740
Radioactive and associated materials	1,421	1,213	1,132	215	1,394	952	1143	130
Dyeing, tanning, and coloring materials	158	163	162	123	358	300	213	103
Pigments, paints, and varnishes	335	328	332	182	232	145	103	25
Medicinals and pharmaceuticals	2,628	2,494	2,275	800	931	703	563	211
Flavors, perfumes, cosmetics, and toiletries	498	493	514	195	521	370	295	176
Cleaning and polishing materials	308	295	324	175	118	90	76	29
Fertilizers, manufactured	1,815	1,267	1,386	812	1,142	997	963	631
Explosives and pyrotechnics	146	87	90	50	84	64	67	20
Plastics and resins	4,050	3,732	3,650	1618	1,484	1,098	786	327
Pesticides and disinfectants	707	630	607	a	308	251	265	a
Miscellaneous chemical products	1,992	1,885	2,010	1166	797	717	579	253
TOTAL	**$22,336**	**$19,751**	**$19,891**	**$8822**	**$13,697**	**$10,779**	**$9494**	**$4018**

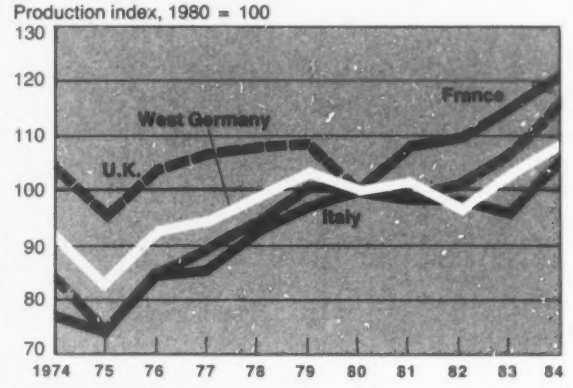
a Included in miscellaneous chemical products. **Source:** Department of Commerce

5 Foreign Chemical Industries—Western Europe

Chemical companies throughout Western Europe turned in a good performance last year. Net income, compared with 1983, was up, in some cases by sizable amounts. The most dramatic increase was provided by France's Rhône-Poulenc, but others showing a better than 50% gain were DSM, Norsk Hydro, Solvay, BASF, Laporte, Bayer, Imperial Chemical Industries, and Fisons. Even Montedison, long in the red, managed to just break into the black.

Increases in sales, earnings, and capital outlays aren't immediately evident when viewing the U.S. dollar equivalents of the actual results. The reason is that last year the dollar continued to strengthen against European currencies. Ironically, this strengthening helped boost sales of European products in dollar trading areas and contributed to the improved earnings picture.

Chemical output rose smartly in 1984



CHEMICAL INDUSTRY TRENDS: Output grows but currency translation affects dollar values

$ Billions (U.S.)	1984	1983	1982	1981	1980
WEST GERMANY					
Sales	$ 49.5	$ 49.7	$ 48.5	$ 51.6	$ 59.2
Exports	25.1	24.0	22.9	23.8	26.0
Imports	14.0	13.6	13.0	13.3	14.6
Capital spending	2.5	2.7	2.8	3.1	3.8
Production index[a]	108.8	103.4	96.4	101.6	100.0
Price index[a]	118.1	113.9	113.7	108.7	100.0
Employees (thousands)	550	549	559	548	550
FRANCE					
Sales	$ 29.1	$ 30.1	$ 30.4	$ 33.4	$ 37.3
Exports	12.2	11.5	11.2	11.9	13.0
Imports	9.2	8.9	9.1	9.2	10.4
Capital spending	1.0	1.0	1.1	1.2	1.6
Production index[a]	121.2	114.9	110.2	108.8	100.0
Price index[a]	153.1	139.9	128.2	114.2	100.0
Employees (thousands)	279	282	286	289	296
U.K.[b]					
Sales	$ 25.7	$ 25.6	$ 28.2	$ 37.6	$ 41.0
Exports	11.0	10.5	11.5	12.3	12.3
Imports	8.8	8.1	8.2	7.9	7.3
Capital spending	1.4	1.4	1.9	2.5	3.2
Production index[a]	115.6	108.7	100.8	98.7	100.0
Price index[a]	125.2	119.1	113.5	106.3	100.0
Employees (thousands)	329	330	338	395	430
ITALY					
Sales	$ 23.3	$ 22.9	$ 22.7	$ 24.1	$ 28.7
Exports	5.8	5.7	5.0	5.6	5.9
Imports	8.6	7.9	7.4	7.8	9.0
Capital spending	1.0	1.1	1.1	1.1	1.9
Production index[a]	106.2	100.0	98.3	98.1	100.0
Price index[a]	148.2	134.9	124.1	111.9	100.0
Employees (thousands)	241	251	260	271	289
SPAIN					
Sales	$ 14.8	$ 14.2	$ 15.2	$ 15.7	$ 17.3
Exports	2.7	2.2	2.2	2.3	2.5
Imports	3.0	2.8	2.9	3.1	3.5
Capital spending	0.2	0.3	0.4	0.4	0.7
Production index[a]	111.0	104.5	100.0	98.3	100.0
Price index[a]	162.1	147.4	131.0	116.9	100.0
Employees (thousands)	241	242	243	244	244

$ Billions (U.S.)	1984	1983	1982	1981	1980
BELGIUM[b,c]					
Sales	$ 13.6	$ 13.2	$ 14.1	$ 15.3	$ 16.6
Exports[d]	9.2	8.8	8.9	9.2	10.4
Imports[d]	6.6	6.3	6.3	6.4	7.5
Capital spending	0.4	0.4	0.3	0.4	0.5
Production index[a]	114.9	107.3	103.1	101.1	100.0
Price index[a]	139.9	133.7	126.0	110.7	100.0
Employees (thousands)	89	88	88	88	90
NETHERLANDS					
Sales	$ 13.5	$ 13.1	$ 12.5	$ 13.6	$ 14.3
Exports	12.5	12.0	11.3	11.9	13.0
Imports	7.2	6.8	6.7	7.1	7.9
Capital spending	0.8	0.7	0.6	0.6	0.7
Production index[a]	119.0	111.0	100.0	97.7	100.0
Price index[a]	124.2	115.0	114.0	114.4	100.0
Employees (thousands)	89	88	90	91	91
SWITZERLAND					
Sales	$ 6.5	$ 6.7	$ 6.6	$ 6.7	$ 6.8
Exports	5.4	5.5	5.4	5.4	5.6
Imports	3.4	3.3	3.3	3.3	3.7
Production index[a]	115.7	109.6	103.0	104.2	100.0
Price index[a]	109.1	106.4	106.8	104.9	100.0
Employees (thousands)	68	68	na	63	62
SWEDEN					
Sales	$ 4.1	$ 3.9	$ 4.0	$ 4.1	$ 4.3
Exports	1.9	1.8	1.6	1.6	1.7
Imports	2.7	2.7	2.6	2.5	2.9
Capital spending	0.3	0.3	0.3	0.3	0.4
Production index[a]	116.9	113.2	104.8	109.4	100.0
Price index[a]	147.0	135.5	120.4	108.8	100.0
Employees (thousands)	43	43	44	41	39
NORWAY					
Sales	$ 2.2	$ 2.1	$ 2.0	$ 1.9	$ 2.1
Exports	1.2	1.1	1.0	1.5	1.2
Imports	1.0	0.9	0.9	1.0	1.1
Capital spending	0.1	0.1	0.1	0.1	0.2
Production index[a]	118.0	110.0	100.6	101.7	100.0
Price index[a]	128.1	123.6	117.9	112.5	100.0
Employees (thousands)	17	17	18	17	17

a (1980 = 100). b Excludes fibers. c Includes rubber and plastics processing. d Includes Luxembourg. **Sources:** National agencies and European Council of Chemical Manufacturers' Federations (CEFIC)

MAN-MADE FIBERS: Noncellulosics continue recovery from 1982 slump

Millions of lb	1984		1983		1982		1981		1980		Change, 1983–84	
	Non-cellulosics[a]	Cellulosics	Non-cellulosics[a]	Cellulosics	Non-cellulosics[a]	Cellulosics	Non-cellulosics[a]	Cellulosics	Non-cellulosics[a]	Cellulosics	Non-cellulosics[a]	Cellu-losics
West Germany	1696	359	1654	334	1511	315	1735	322	1619	304	3%	7%
Italy	1324[b]	68	1166[b]	65	1091[b]	102	1115[b]	133	896[b]	144	14	5
Spain	578	73	539	70	507	95	526	111	452	116	7	4
U.K.	559[c]	305[d]	541[c]	330[d]	506[c]	263[d]	612[c]	298[d]	700[c]	364[d]	3	−8
France	452	61	437	83	435	100	444	119	423	146	3	−27
Switzerland	218	0	204	0	183	0	197	0	186	4	7	—
Benelux countries	206	94	189	90	198	124	229	144	230	148	9	4
Ireland	130	0	118	0	114	0	111	0	92	0	10	—
Portugal	106	0	95	1	99	3	83	7	67	6	12	−100
Austria	53	268	53	251	51	251	53	257	56	255	0	7

a Excludes polypropylene. b Includes polypropylene filament. c Includes cellulose acetate filament. d Excludes cellulose acetate filament. **Source:** Comité International de la Rayonne et des Fibres Synthétiques

PRODUCTION: Higher last year for the majority of major chemicals

Millions of lb	1984	1983	1982	1981	Change 1983–84
FRANCE					
Sulfuric acid	9898	9024	8858	9917	10%
Hydrochloric acid	1686	1483	1514	1544	14
Chlorine	3103	2872	2759	2711	8
Sodium hydroxide	3274	3064	2939	2893	7
Ammonia	5170	4312	4180	4950	20
Benzene	1343	1373	1133	1100	−2
Toluene	87	90	69	124	−3
Xylenes	188	199	113	251	−6
Ethylene	4581	4563	4112	4085	0
Propylene	2652	2455	2277	2212	8
Butadiene	667	620	569	586	8
Formaldehyde	210	208	175	220	1
Methanol	697	761	753	765	−8
Polyethylenes	2045	2070	1938	1944	−1
Polypropylene	871	842	692	656	3
Polystyrene	1060	1056	972	851	0
Polyvinyl chloride	1737	1796	1729	1563	−3
Synthetic rubber	1218	1125	1045	1070	8
Phosphate fertilizers (P_2O_5)	1495	1577	2447	2590	−5
ITALY					
Sulfuric acid	9370	9071	8818	7861	3%
Nitric acid	2420	2261	2247	2212	7
Phosphoric acid	996	999	970	979	0
Chlorine	2095	1974	1701	1556	6
Sodium hydroxide	2359	2219	1999	1857	6
Ammonia	3233	2494	2804	3239	30
Benzene	1179	1160	841	932	2
Toluene	688	658	580	613	5
Xylenes	871	804	594	564	8
Ethylene	2504	2337	1923	2011	7
Propylene	1244	1143	981	1083	9
Butadiene	399	380	345	366	5
Phthalic anhydride	213	298	298	309	−29
Formaldehyde	325	312	275	240	4
Acetic acid	140	237	342	401	−41
Carbon black	380	339	334	337	12
Polyethylenes	1602	1564	1167	1223	2
Polystyrene	695	725	674	637	−4
Polyvinyl chloride	1493	1391	1302	1292	7
Synthetic rubber	514	504	475	535	2

Millions of lb	1984	1983	1982	1981	Change 1983–84
U.K.					
Sulfuric acid	5829	5692	5692	6360	2%
Hydrochloric acid[a]	352	286	260	257	23
Nitric acid	na	6890	6784	6541	—
Chlorine	2158	1980	1935	1916	9
Benzene	1773	1745	1399	1799	2
Ethylene	2541	2913	2454	2718	−13
Propylene	2147	1830	1695	1621	17
Butadiene	570	523	503	457	9
Acetone	355	268	298	245	32
Formaldehyde	228	228	236	249	0
Phenol	406	315	308	241	29
Polyethylenes	875	896	937	1000	−2
Polypropylene	570	506	487	435	13
Synthetic rubber	625	571	537	493	9
WEST GERMANY					
Sulfuric acid	8002	8009	8334	9018	0%
Hydrochloric acid	2104	1980	1865	1953	6
Nitric acid	6287	5778	5040	6356	9
Chlorine	7536	6900	6253	6629	9
Sodium hydroxide	7395	6830	6318	6687	8
Sodium carbonate	3009	2679	2432	2616	12
Sodium sulfate	282	275	472	561	3
Ammonia	5183	4495	4145	5179	15
Benzene	3163	2939	2258	2027	8
Toluene	789	691	590	578	14
Xylenes	1003	1127	1012	1071	−11
Ethylene	7093	6980	5808	6357	2
Propylene	3969	3793	3259	3550	5
Butadiene	1661	1580	1275	na	5
Ethylene oxide	1044	993	866	955	5
Ethylene glycol	509	450	404	487	13
Propylene glycol	372	351	279	263	6
n-Butanol	589	562	508	505	5
Acetaldehyde	737	647	571	670	14
Acetic acid	668	590	562	646	13
Ethanol	120	171	220	222	−30
Formaldehyde	1283	1175	1070	1117	9
Methanol	1504	1470	1559	1524	2
Phthalic anhydride	453	429	439	474	6
Polyethylenes	2882	2996	2473	2639	−4
Polyvinyl chloride	2490	2398	1902	2021	4
Synthetic rubber	988	951	888	914	4
Nitrogen fertilizers (N)	1843	1642	1464	2191	12
Phosphate fertilizers (P_2O_5)	473	552	595	732	−14

a Manufacturers' sales. na = not available.
Sources: Government agencies for each country

COMPANY RESULTS: With profitability improving, many firms hiked capital and R&D budgets

$ Millions	Net sales	Net income	Profit margin	Capital spending	R&D spending	Employees (thousands)
Bayer (West Germany)						
1984	$15,098.9	$411.9	2.7%	$ 646.3	$686.3	174.8
1983	14,641.6	295.7	2.0	734.1	664.3	174.8
1982	14,335.0	26.3	0.2	846.6	637.9	179.4
1981	14,930.1	228.8	1.5	1123.5	622.1	180.9
Hoechst (West Germany)						
1984	$14,546.3	$474.4	3.3%	$724.9	$637.9	177.9
1983	14,583.9	356.5	2.4	733.3	634.1	179.8
1982	14,397.5	130.5	0.9	850.6	642.4	182.2
1981	15,236.7	188.5	1.2	870.4	670.4	184.7
BASF (West Germany)						
1984	$14,175.4	$314.0	2.2%	$719.6	$435.8	115.8
1983	13,769.0	202.7	1.5	639.2	466.3	114.1
1982	13,368.7	113.2	0.8	824.3	483.1	115.9
1981	14,055.8	162.4	1.2	911.1	484.1	116.6
Imperial Chemical Industries (U.K.)						
1984	$13,247.3	$808.8[a]	6.1%	$589.6	$399.7	115.6
1983	12,528.1	602.4[b]	4.8	547.8	418.8	117.9
1982	12,886.2	253.9	2.0	511.4	427.3	123.8
1981	13,348.9	389.5[c]	2.9	833.7	464.5	132.4
Ciba-Geigy (Switzerland)						
1984	$7,435.7	$505.1	6.8%	$428.5	$619.6	81.4
1983	7,019.5	369.5	5.3	395.2	594.3	79.2
1982	6,802.0	306.4	4.5	427.6	578.8	79.4
1981	6,938.3	265.8	3.8	446.4	549.0	80.2
Montedison (Italy)						
1984	$7,047.2	$ 2.8[d]	0.0%	$279.5	$142.3	71.2
1983	7,017.8	(207.4)[e,f]	—	295.6	171.2	72.8
1982	6,665.9	(529.9)[e,g]	—	324.5	170.7	84.2
1981	7,851.3	(564.6)[e]	—	377.3	175.0	94.2
DSM (Netherlands)						
1984	$7,018.7	$144.2	2.1%	$285.7	$54.5	27.2
1983	6,969.8	57.5	0.8	230.9	61.4	27.9
1982	6,806.0	(70.3)[e]	—	165.5	63.7	28.6
1981	7,330.4	40.4	0.6	196.8	64.0	30.0
Rhône-Poulenc (France)						
1984	$5,858.4	$227.6	3.9%	$395.2	$281.7	80.0
1983	5,658.4	12.9	0.2	365.4	286.0	80.8
1982	5,661.5	(128.5)[e]	—	329.7	267.6	81.8
1981	6,604.6	(61.6)[e]	—	447.8	279.8	89.3
Akzo (Netherlands)						
1984	$5,146.4	$252.0[h]	4.9%	$244.2	$198.8	66.1
1983	5,293.0	189.1[i]	3.6	219.3	217.5	66.3
1982	5,301.1	85.0[j]	1.6	273.4	232.2	73.7
1981	5,790.4	95.6[k]	1.6	277.2	234.0	77.8
Norsk Hydro (Norway)						
1984	$4,357.5	$130.5	3.0%	$596.4	na	19.8
1983	4,077.9	66.8	1.6	593.0	na	18.8
1982	3,185.9	24.2	0.8	509.3	na	19.6
1981	3,045.6	65.0	2.1	370.7	na	15.1
Solvay (Belgium)						
1984	$3,883.9	$200.2[l]	5.2%	$179.9	$126.7	43.5
1983	3,887.0	128.3[m]	3.3	155.3	127.1	44.2
1982	3,891.3	47.6[n]	1.2	153.8	131.1	45.4
1981	4,239.7	(9.9)[e,o]	—	247.6	143.4	48.2
Hoffmann-La Roche (Switzerland)						
1984	$3,519.1	$161.8	4.6%	$194.0	$486.4	46.2
1983	3,576.2	156.4	4.4	216.1	473.5	45.9
1982	3,499.2	138.5	4.0	346.7	453.5	46.5
1981	3,456.4	129.1	3.7	308.6	414.2	44.0
Sandoz (Switzerland)						
1984	$3,163.4	$174.9	5.5%	$129.4	$269.8	38.0
1983	3,117.1	152.4	4.9	128.8	261.9	38.1
1982	2,981.8	134.5	4.5	124.6	244.8	37.3
1981	2,941.8	115.8	3.9	155.6	236.2	36.4
BOC International (U.K.)						
1984	$2,811.5	$106.0[p]	3.8%	$322.6	$56.6	38.7
1983	2,582.1	83.2[q]	3.2	468.1	40.8	39.1
1982	2,686.9	113.0[r]	4.2	388.3	43.6	38.4
1981	3,086.6	93.9[s]	3.0	316.0	38.9	42.1
Albright & Wilson (U.K.)						
1984	$ 761.2	$29.3[t]	3.8%	$46.8	na	6.3
1983	865.3	31.9[u]	3.7	37.2	na	6.3
1982	929.6	12.4[v]	1.3	33.6	na	7.2
1981	1,019.9	9.3[w]	0.9	51.7	na	8.9
Fisons (U.K.)						
1984	$ 738.8	$50.8[x]	6.9%	$9.4	$20.1	8.6
1983	554.5	38.1[y]	6.9	4.7	21.2	7.5
1982	613.8	25.4	4.1	3.2	29.4	7.5
1981	1,002.8	7.8	0.8	3.9	31.2	9.8
UCB (Belgium)						
1984	$534.8	$22.9[z]	4.3%	$21.6	$18.4	6.5
1983	572.4	22.0[aa]	3.8	23.5	17.6	6.4
1982	606.6	9.4	1.6	20.0	17.2	6.7
1981	686.0	4.3	0.6	31.0	18.7	7.8
Laporte Industries (U.K.)						
1984	$475.4	$38.5[bb]	8.1%	$13.5	na	3.6
1983	440.4	27.7[cc]	6.3	7.7	na	3.5
1982	425.5	19.3[dd]	4.6	21.7	na	3.5
1981	435.5	12.8	2.9	20.3	na	3.9

a Excludes nonrecurring loss of $26.7 million. b Excludes nonrecurring loss of $28.8 million. c Excludes nonrecurring loss of $12.2 million. d Excludes profits to minority interests of $50.1 million. e Deficit. f Excludes minority interests' loss of $4.6 million. g Excludes nonrecurring loss of $105.7 million and gain from minority interests of $0.7 million. h Excludes nonrecurring loss of $10.9 million. i Excludes nonrecurring loss of $35.8 million. j Excludes nonrecurring loss of $18.4 million. k Excludes nonrecurring gain of $2.8 million. l Excludes nonrecurring loss of $60.9 million. m Excludes nonrecurring loss of $25.7 million. n Excludes nonrecurring gain of $9.2 million. o Excludes nonrecurring loss of $10.3 million. p Excludes extraordinary gain of $16.7 million. q Excludes nonrecurring loss of $19.4 million. r Excludes nonrecurring gain of $10.7 million. s Excludes nonrecurring gain of $1.2 million. t Excludes nonrecurring loss of $267,000. u Excludes nonrecurring gain of $1.5 million. v Excludes nonrecurring loss of $17.2 million. w Excludes nonrecurring gain of $1.8 million. x Excludes nonrecurring loss of $5.6 million. y Excludes nonrecurring loss of $10.0 million. z Excludes extraordinary gain of $743,000. aa Excludes nonrecurring loss of $3.0 million. bb Excludes extraordinary gain of $57.8 million. cc Excludes nonrecurring loss of $3.5 million. dd Excludes nonrecurring gain of $138.4 million. na = not available.

NOTE ON CURRENCY CONVERSION

For monetary statistics in this section, European currencies were converted to U.S. dollars by the following conversion rates:

	$1.00 (U.S.) is equivalent to:									
	Belgium	France	Italy	Netherlands	Norway	Spain	Sweden	Switzerland	U.K.	West Germany
1984	57.78 francs	8.74 francs	1757 lire	3.21 guilders	8.16 crowns	160.76 pesetas	8.27 crowns	2.35 francs	0.748 pound	2.85 marks
1983	51.13 francs	7.62 francs	1519 lire	2.85 guilders	7.30 crowns	143.43 pesetas	7.67 crowns	2.10 francs	0.659 pound	2.55 marks
1982	45.69 francs	6.57 francs	1353 lire	2.67 guilders	6.45 crowns	109.86 pesetas	6.28 crowns	2.03 francs	0.571 pound	2.43 marks
1981	37.13 francs	5.44 francs	1137 lire	2.50 guilders	5.74 crowns	92.31 pesetas	5.06 crowns	1.96 francs	0.493 pound	2.26 marks
1980	29.24 francs	4.23 francs	856 lire	1.99 guilders	4.94 crowns	71.71 pesetas	4.23 crowns	1.67 francs	0.430 pound	1.82 marks

1984 was a year of recovery for the Japanese chemical industry. For many chemicals and plastics, production set new records. More important, profits of many chemical companies staged a comeback.

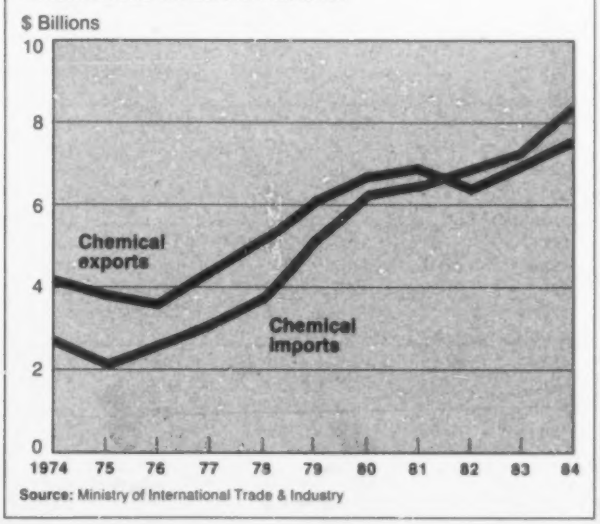
The chemical industry production index was up a respectable 8.5% last year. Even the petrochemical sector, long troubled by international competition, pushed output ahead 16%. If there was a weak spot, it was in chemical trade. Japanese chemical exports advanced 9% to $7.6 billion, but imports increased 16% to $8.3 billion. The resulting $721 million deficit was triple that of 1983. This weakness is a not-so-subtle clue that Japan's chemical industry may be hard-pressed to repeat last year's stellar performance.

PRODUCTION: Organics, polymers set pace

Production indexes, 1980 = 100	1984	1983	1982	1981	Change 1983–84
All chemicals	118.0	108.8	102.5	99.8	8%
All manufacturing	116.7	104.9	101.4	101.0	11
Inorganic chemicals and pigments	105.6	101.7	95.7	98.7	4
Alkalies and chlorine	95.2	90.7	90.1	91.3	5
Organic chemicals	96.9	86.6	86.5	89.2	12
Petrochemicals	113.8	98.5	92.4	94.5	16
Aromatics	106.6	96.1	90.7	94.4	11
Cyclic intermediates and dyes	116.9	105.1	97.5	98.3	11
Plastics	119.7	105.2	96.5	95.4	14
Synthetic fibers	100.2	97.1	96.0	97.9	3
Synthetic rubber	106.1	91.6	85.1	92.3	16
Fertilizer	79.8	77.4	80.2	84.6	3
Textile materials	108.0	98.6	97.0	99.7	10
Medicinals and drugs	135.2	126.9	116.8	107.8	7

Source: Ministry of International Trade & Industry

Exports increase but trade gap in chemicals widens further



Source: Ministry of International Trade & Industry

PRODUCTION: Plastics lead the recovery

Thousands of metric tons unless otherwise indicated	1984	1983	1982	1981	Change 1983–84
ORGANIC CHEMICALS					
Acetaldehyde	297	255	279	324	16%
Acetic acid	350	328	353	365	7
Acetone	246	247	229	225	0
Acrylonitrile	523	459	489	477	14
Benzene	2013	1750	1588	1690	15
Butadiene	657	556	522	518	18
Butyl alcohol	243	229	228	237	6
Caprolactam	436	395	388	427	10
Cyclohexane	492	454	426	475	8
Dioctylphthalate	249	231	221	223	8
Ethylene	4384	3684	3590	3655	19
Ethylene dichloride	1939	1736	1548	1650	12
Ethylene glycol	429	357	385	411	20
Ethylene oxide	533	468	471	478	14
Methanol, refined	280	373	625	734	−25
Octyl alcohol, synthetic	246	219	226	239	12
Phenol, synthetic	272	271	211	214	0
Phthalic anhydride	156	161	159	164	−3
Propylene	2959	2632	2565	2538	11
Propylene glycol	205	194	185	171	6
Styrene	1421	1167	1086	1095	22
Terephthalic acid	745	702	649	635	6
Toluene	784	831	803	821	−6
Toluene diisocyanate	76	74	67	64	3
Urea	1401	1264	1225	1483	11
Xylene	1120	980	1187	1202	14
INORGANIC CHEMICALS					
Ammonia	2029	1881	2010	2228	8
Ammonium chloride	387	435	486	584	−8
Ammonium sulfate	1829	1722	1689	1817	6
Calcium carbide	478	476	483	495	0
Calcium superphosphate	559	559	527	483	0
Carbon black	602	568	504	557	6
Chlorine, liquid	897	818	794	764	10
Hydrochloric acid	521	511	551	565	2
Nitrogen, millions of cu m	5896	5369	5236	5147	10
Oxygen, millions of cu m	7216	6434	6493	6603	12
Sodium carbonate	1036	1103	1162	1178	−6
Sodium hydroxide	3085	2863	2792	2872	8
Sodium silicate	596	588	650	692	1
Sulfuric acid	6458	6662	6530	6572	3
Titanium dioxide	205	196	184	176	5
PLASTICS					
Phenolic resins	334	303	281	294	10
Polyethylene	2251	1773	1674	1671	27
Polypropylene	1271	1062	941	959	20
Polystyrene	1503	1311	1190	1183	15
Polyvinyl chloride	1504	1420	1218	1129	6
DYES, synthetic	57	55	54	50	4
RUBBER CHEMICALS, organic	45	42	39	43	7
RUBBER, synthetic	1130	1002	931	1010	16

Source: Ministry of International Trade & Industry

COMPANY RESULTS: Profitability improved modestly last year for most chemical firms

$ Millions	Sales	Net income	Profit margin	Total assets	Employees (thousands)
Mitsubishi Chemical Industries[a]					
1984	$3271	$ 0.0	—	$3211	8.3
1983	3155	0.6	0.0%	3479	8.5
1982	3142	(36.5)[b]	—	3326	8.4
1981	3399	13.5	0.4	3374	8.3
Asahi Chemical Industry					
1984	$3168	$57.2	1.8%	$3027	15.9
1983	2985	47.0	1.6	3022	16.3
1982	2670	45.8	1.7	2809	14.0
1981	2663	48.4	1.8	2895	13.6
Sumitomo Chemical[c]					
1984	$2862	$73.6	2.6%	$2818	6.9
1983	2783	17.3	0.6	2775	7.9
1982	2681	(30.6)[b]	—	2510	9.1
1981	2881	10.5	0.4	2699	9.6
Toray Industries					
1984	$2617	$55.2	2.1%	$2663	13.2
1983	2588	66.0	2.6	2576	14.1
1982	2398	59.4	2.5	2385	13.9
1981	2503	48.3	1.9	2446	13.9
Teijin					
1984	$1758	$53.2	3.0%	$1842	7.2
1983	1797	51.4	2.9	1846	7.1
1982	1751	30.1	1.7	1953	7.1
1981	2072	24.1	1.2	2090	7.2
Dainippon Ink & Chemicals					
1984	$1676	$20.4	1.2%	$1449	6.0
1983	1681	19.0	1.1	1472	6.0
1982	1609	17.9	1.1	1426	5.9
1981	1657	18.8	1.1	1511	5.9
Showa Denko[c]					
1984	$1656	$ 0.0	—	$2069	4.6
1983	1500	(6.6)[b]	—	2086	5.0
1982	1539	(2.9)[b]	—	2004	5.3
1981	1729	2.6	0.2%	2102	5.4
Mitsui Toatso Chemicals					
1984	$1635	$ 10.2	0.6%	$1810	5.3
1983	1695	(14.7)[b]	—	1794	5.4
1982	1783	44.9	2.5	1790	5.7
1981	1948	(22.3)[b]	—	1858	7.4
Mitsubishi Petrochemical[c]					
1984	$1594	$ 40.9	2.6%	$1553	2.3
1983	1547	2.0	0.1	1644	2.5
1982	1508	(37.4)[b]	—	1767	3.5
1981	1667	(6.3)[b]	—	1802	3.9
Sekisui Chemical					
1984	$1431	$18.4	1.3%	$1184	6.1
1983	1369	15.7	1.2	1199	6.1
1982	1294	9.0	0.7	1238	6.2
1981	1338	7.9	0.6	1322	6.1
Mitsui Petrochemical Industries					
1984	$1226	$24.5	2.0%	$1413	4.3
1983	1227	16.1	1.3	1392	4.3
1982	1200	(7.1)[b]	—	1412	4.5
1981	1260	(8.6)[b]	—	1455	4.6
Unitika					
1984	$1165	$ 6.5	0.6%	$1111	5.5
1983	1192	0.6	0.1	1146	6.4
1982	1045	(18.6)[b]	—	1113	6.2
1981	965	0.4	0.0	1135	6.2

$ Millions	Sales	Net income	Profit margin	Total assets	Employees (thousands)
Mitsubishi Gas Chemical					
1984	$1014	$20.0	2.0%	$944	3.7
1983	937	12.9	1.4	891	3.8
1982	909	9.9	1.1	884	3.8
1981	931	20.8	2.2	938	3.8
Shin Etsu Chemical[d]					
1984	$961	$32.3	3.4%	$695	2.6
1983	871	32.8	3.8	609	2.5
1982	668	18.4	2.8	601	2.5
1981	674	8.5	1.3	629	2.4
Hitachi Chemical					
1984	$932	$14.7	1.6%	$571	4.8
1983	849	11.1	1.3	489	4.5
1982	751	8.5	1.1	465	4.4
1981	753	9.9	1.3	451	4.3
Kyowa Hakko Kogyo[c]					
1984	$920	$22.1	2.4%	$888	5.4
1983	929	21.2	2.3	836	5.1
1982	915	21.0	2.3	802	5.0
1981	928	18.8	2.0	782	4.9
Mitsubishi Rayon					
1984	$920	$18.4	2.0%	$869	3.8
1983	912	13.1	1.4	884	3.7
1982	841	9.9	1.2	824	3.6
1981	894	11.0	1.2	803	3.5
Toyo Soda Mfg.					
1984	$920	$ 28.6	3.1%	$1233	3.8
1983	948	29.0	3.1	1133	3.9
1982	883	(10.7)[b]	—	1131	4.3
1981	927	(60.4)[b]	—	1209	4.9
Denki Kagaku Kogyo					
1984	$879	$ 28.6	3.3%	$1117	4.0
1983	874	(15.2)[b]	—	1112	4.0
1982	797	8.5	1.1	1091	4.0
1981	867	10.4	1.2	1092	4.0
Kuraray					
1984	$859	$7.0	0.8%	$951	6.0
1983	869	5.3	0.6	943	6.4
1982	821	4.3	0.5	904	6.3
1981	879	8.2	0.9	928	6.3
Japan Synthetic Rubber					
1984	$838	$13.5	1.6%	$775	2.7
1983	783	18.0	2.3	678	2.7
1982	699	7.5	1.1	709	2.7
1981	737	3.0	0.4	720	2.7
Kanegafuchi Chemical Industry					
1984	$818	$22.5	2.8%	$622	2.9
1983	778	9.9	1.3	597	2.9
1982	673	8.3	1.2	546	3.3
1981	719	5.9	0.8	583	3.2
Daicel Chemical					
1984	$720	$20.0	2.8%	$687	3.1
1983	697	17.2	2.5	643	3.1
1982	654	12.9	2.0	634	3.1
1981	702	12.5	1.8	656	3.1
Tokuyama Soda					
1984	$695	$8.2	1.2%	$748	2.3
1983	695	4.5	0.7	691	2.4
1982	695	5.5	0.8	669	2.5
1981	768	4.4	0.6	691	2.5

a Fiscal year ends Jan. 31. b Deficit. c Fiscal year ends Dec. 31. d Fiscal year ends May 31. **Note:** Fiscal years end March 31 for each year unless otherwise indicated. Fiscal year 1984 data are estimates. Results are converted from yen to U.S. dollars on the following basis: Fiscal year 1984: $1.00 = 244.6 Y; fiscal year 1983: $1.00 = 236.7 Y; fiscal year 1982: $1.00 = 235.8 Y; fiscal year 1981: $1.00 = 222.4 Y. Year-to-year changes in sales, net income, and assets are affected by fluctuations in the currency exchange rate. **Source:** Toyo Keizai Shinposha

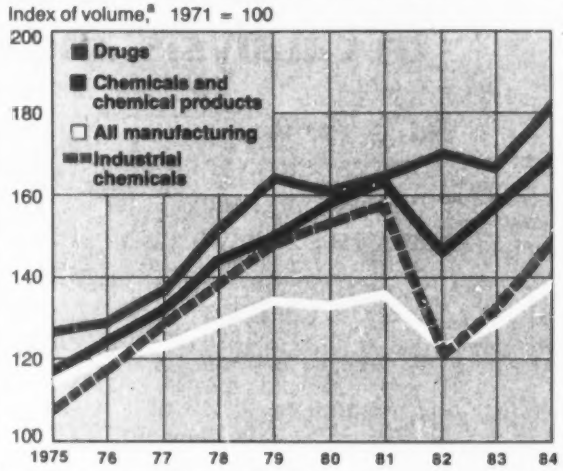
5 Foreign Chemical Industries—Canada

With several new world-scale plants coming on stream last year, the Canadian chemical industry chalked up sizable gains in production of many key chemicals, particularly olefins and their derivatives. Output of several large-volume inorganic chemicals scored substantial increases, as well. The aromatics, however, did not fare so well.

Nevertheless, 1984 has to be scored a good year for Canadian chemicals. For most companies, sales, net incomes, and profit margins all increased. What pressure there was on profits fell mainly in the petrochemical sector, where high feedstock costs—the result of government energy-pricing policies and up-front taxes—eroded competitiveness of Canadian products against foreign petrochemicals.

Despite this, Canadian chemical companies boosted exports 22% to $5.3 billion. And because chemical imports grew only 19% (to $5.2 billion), Canada was able to swing its chemical trade balance marginally back into the black from the previous year's small deficit.

Output bounces back from 1982 low



a Gross domestic product. Source: Statistics Canada

COMPANY RESULTS: Earnings increase

$ Millions (Canadian)	Sales	Net income[a]	Profit margin	Capital expenditures	Employees (thousands)
C-I-L Inc.					
1984	$1176.0	$38.0	3.2%	$118.3	6.3
1983	1113.8	23.9	2.1	109.0	6.7
1982	1059.8	15.2	1.4	85.5	6.9
1981	1149.9	54.3	4.7	94.1	7.8
Celanese Canada					
1984	$387.4	$ 7.8	2.0%	$13.3	2.8
1983	378.8	9.4	2.5	12.0	3.4
1982	305.5	(5.2)[b]	—	54.0	3.4
1981	354.1	20.7	5.9	85.5	3.5
Du Pont Canada					
1984	$1170.6	$41.2	3.5%	$45.2	5.0
1983	1116.4	35.2	3.2	25.2	5.0
1982	980.0	(7.4)[b]	—	23.9	5.4
1981	1139.1	33.5	2.9	47.2	6.1
Polysar					
1984	$1416.2	$ 35.9	2.5%	$ 57.2	6.0
1983	1336.9	8.7	0.7	144.2	6.0
1982	1330.0	(30.5)[b]	—	207.0	6.6
1981	1049.0	74.0	7.1	58.3	5.4
Union Carbide Canada					
1984	$691.4	$ 5.7	0.8%	$ 26.6	4.1
1983	687.0	(1.4)[b]	—	55.9	4.2
1982	691.3	(17.9)[b]	—	67.6[c]	4.5
1981	827.3	36.1	4.4	100.0	5.0

a Excluding extraordinary gains and losses. b Deficit. c Excludes $50.9 million spent on Prentiss, Alta., ethylene glycol plant that was transferred to another Union Carbide subsidiary.

PRODUCTION: Plastics, fertilizers set the pace

Thousands of metric tons	1984	1983	1982	1981	Change 1983–84
ORGANIC CHEMICALS					
Benzene	557	580	519	571	4%
Butadiene	138	133	118	126	3
Butylene	129	138	107	124	−6
Ethylene	1464	1196	1013	1330	22
Formaldehyde	92	90	70	85	2
Methanol	1872	1671	na	na	12
Propanol	63	63	67	73	0
Propylene	665	644	693	671	3
Toluene	430	411	471	480	5
Urea	2110	1445	1231	1303	46
Xylene	417	426	431	409	−2
INORGANIC CHEMICALS					
Ammonia, anhydrous 100%	3493	2889	2509	2654	21
Ammonium nitrate	969	934	1018	1212	4
Ammonium phosphate	1383	1259	1027	1355	10
Chlorine	1424	1385	1233	1292	3
Hydrochloric acid	161	160	143	186	1
Nitric acid	1100	1061	977	1158	4
Phosphoric acid, 100% P_2O_5	691	656	553	744	5
Sodium chlorate	313	294	264	255	6
Sodium hydroxide	1575	1528	1367	1458	3
Sulfuric acid	4053	3686	3131	4117	10
SYNTHETIC RESINS					
Polyesters, unsaturated	34	26	27	26	27
Polyethylene, high density	227	211	194	222	7
Polyethylene, low density	529	412	376	410	28
Polyvinyl chloride	252	243	193	222	4

na = not available. Source: Statistics Canada

SHIPMENTS: A good year for chemical products nearly across the board

$ Millions (Canadian)	1984	1983	1982	1981	1980	Change 1983–84
All manufacturing	$225,817	$199,561	$183,433	$190,685	$168,365	13%
Chemicals and chemical products	15,475	14,371	12,774	13,189	11,218	8
Industrial chemicals, inorganic	2,536	2,325	2,231	2,192	1,856	9
Industrial chemicals, organic	3,175	3,153	2,768	3,202	2,643	1
Plastics and synthetic resins	1,615	1,503	1,286	1,512	1,372	7
Pharmaceuticals and medicinals	2,087	1,785	1,560	1,327	1,144	17
Fertilizers, mixed	255	224	208	218	189	14
Paint and varnish	1,103	1,009	835	880	747	9
Soap and cleaning compounds	1,311	1,197	1,053	1,020	866	10
Toilet preparations	768	711	611	589	504	8
Pigments and dry colors	325	290	260	252	221	12
Printing ink	231	207	193	189	169	12
Miscellaneous chemical products	2,069	1,968	1,768	1,810	1,508	5
Man-made fibers	1,418	1,414	1,164	1,400	1,270	0

Source: Statistics Canada

CHEMICAL IMPORTS: Big jump last year

$ Millions (Canadian)	1984	1983	1982	Change 1983–84
Inorganic chemicals	$ 498	$ 411	$ 370	21%
Organic chemicals	1464	1200	1019	16
Fertilizers and fertilizer materials	206	184	143	12
Synthetic and reclaimed rubber	207	160	139	29
Plastics materials	842	751	553	12
Plastic film and sheet	331	268	208	24
Other plastic shapes and forms	264	181	137	46
Dyes, except dyeing intermediates	73	77	63	--5
Pigments, lakes, and toners	100	81	52	23
Paints and related products	148	111	85	33
Other chemical products	1077	900	818	20
TOTAL	**$5210**	**$4392**	**$3586**	**19%**
Imports from U.S.	**$4070**	**$3425**	**$2796**	**19%**
U.S. share, %	**78%**	**78%**	**78%**	**—**

Source: Statistics Canada

CHEMICAL EXPORTS: Up more than imports

$ Millions (Canadian)	1984	1983	1982	Change 1983–84
Chemical elements	$ 228	$ 187	$ 170	22%
Other inorganic chemicals	1040	785	826	32
Organic chemicals	1296	1201	1098	8
Fertilizers and fertilizer materials	1530	1160	1022	32
Synthetic rubber and plastic materials	629	521	516	21
Plastics, basic shapes and forms	266	198	174	34
Other chemical products	309	285	229	8
TOTAL	**$5299**	**$4337**	**$4035**	**23%**
Exports to U.S.	**$3481**	**$2843**	**$2528**	**22%**
U.S. share, %	**66%**	**66%**	**63%**	**—**

Source: Statistics Canada

TRADE BALANCE: Growth for total surplus

$ Millions (Canadian)	1984	1983	1982	1981
Total exports	$109,543	$88,506	$81,825	$81,337
Total imports	95,754	75,587	67,856	79,482
Trade balance	13,789	12,919	13,969	1,855

Chemical trade balance barely back in black

Chemical exports	$ 5,299	$ 4,337	$ 4,035	$ 4,605
Chemical imports	5,210	4,392	3,586	3,814
Chemical trade balance	89	−55	449	791

Source: Statistics Canada

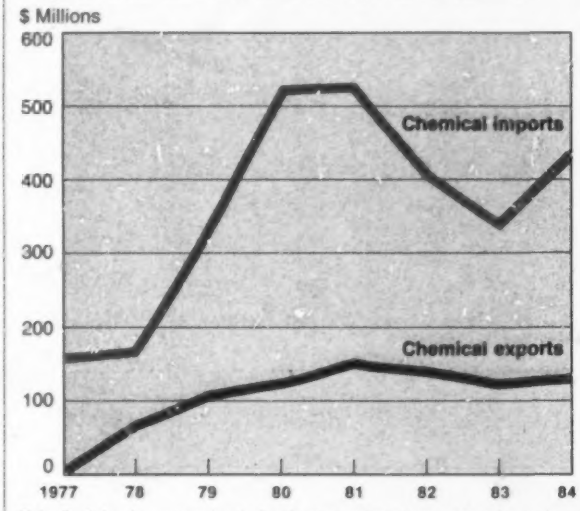
PRICES: Higher for most chemicals

Industry selling price indexes, 1971 = 100	Annual average 1984	1983	1982	Change 1983–84
All manufacturing	310.9	298.8	288.8	4%
Chemicals and chemical products	327.8	316.6	306.9	4
Industrial chemicals—inorganic	360.7	341.6	337.5	6
Ammonium nitrate[a]	218.5	208.9	221.5	5
Chlorine	381.7	360.2	315.5	6
Oxygen	257.3	237.7	224.0	8
Sodium hydroxide	461.1	467.1	450.1	−1
Industrial chemicals—organic	443.7	439.2	429.7	1
Plastics and synthetic resins	328.8	314.3	297.7	5
Alkyds	224.8	210.5	209.0	7
Phenol-formaldehyde	377.5	354.3	344.5	7
Polyethylene	323.5	309.9	290.2	4
Fertilizers, mixed	296.7	284.2	294.5	4
Pharmaceuticals and medicinals	250.3	233.6	211.9	7
Paint and varnish	302.6	304.3	300.0	−1
Pesticides	339.6	332.7	316.6	2
Synthetic fibers	250.3	242.6	254.9	3
Petroleum refineries	714.7	684.7	643.7	4
Benzene	423.1	446.3	427.4	−5
Toluene	622.9	606.0	620.4	3
Xylene	559.3	544.6	558.0	3

a Fertilizer grade. **Source:** Statistics Canada

5 Foreign Chemical Industries—Mexico

Imports rebound, widening trade deficit



Note: Trade in primary petrochemicals only; does not include secondary chemicals.
Source: Petróleos Mexicanos

DOMESTIC SALES: Generally above 1983

Thousands of metric tons[a]	1984	1983	1982	1981	Change 1983–84
Acetaldehyde	212	200	156	124	6%
Acrylonitrile	84	86	71	74	−2
Ammonia, anhydrous	1667	1455	1338	1205	15
Benzene	12	11	13	12	9
Butadiene	106	84	66	70	26
Cyclohexane	50	51	50	53	−3
Dodecylbenzene	101	107	111	92	−5
Ethylene oxide	112	105	78	78	6
Hexane	50	47	54	51	7
Isopropyl alcohol	58	54	47	32	8
Methanol	162	140	129	125	16
Polyethylene, high density	137	120	120	100	14
Polyethylene, low density	222	251	261	258	−11
Styrene	125	116	118	117	7
Sulfur	478	319	365	428	50
Toluene	85	81	86	88	5
Vinyl chloride	259	206	139	145	26
o-Xylene	32	33	27	27	−5
p-Xylene	263	131	187	187	101

a Domestic sales by Petróleos Mexicanos (Pemex) of primary petrochemicals. **Source:** Pemex

CHEMICAL IMPORTS: Sharp rises for many

Thousands of metric tons[a]	1984	1983	1982	1981	Change 1983–84
Acetaldehyde	70	42	13	6	66%
Acrylonitrile	34	28	17	20	19
Benzene	0	0	12	21	—
Butadiene	67	45	50	55	49
Cyclohexane	26	3	13	8	872
Dichloroethane	57	25	0	2	130
Dodecylbenzene	49	55	47	33	−10
Ethylbenzene	16	6	16	11	174
Ethylene	0	0	31	15	—
Ethylene oxide	11	0	0	31	—
Isopropyl alcohol	44	25	31	15	75
Perchloroethylene	15	9	12	17	67
Polyethylene, high density	19	49	17	10	−62
Polyethylene, low density	63	88	106	126	−29
Propylene	26	17	22	24	54
Propylene tetramer	12	6	15	23	110
Styrene	93	66	61	88	42
Toluene	37	0	12	23	—
Vinyl chloride	109	75	71	84	46
o-Xylene	0	7	10	12	—
p-Xylene	119	25	131	148	383

a Imports by Petróleos Mexicanos (Pemex) of primary petrochemicals. **Source:** Pemex

PRODUCTION: Lower for most chemicals

Thousands of metric tons[a]	1984	1983	1982	1981	Change 1983–84
Acetaldehyde	147	153	149	122	−4%
Acrylonitrile	49	55	53	54	−11
Ammonia, anhydrous	2156	2355	2469	2183	−8
Benzene	156	139	96	77	13
Butadiene	20	18	15	12	9
Cyclohexane	30	49	35	44	−38
Cumene	33	37	20	2	−10
Dichloroethane	220	265	201	117	−17
Dodecylbenzene	51	57	62	60	−10
Ethane	1574	1638	1550	1337	−4
Ethylbenzene	31	24	23	29	28
Ethylene	643	645	396	378	0
Ethylene oxide	97	112	79	48	−13
Hexane	95	64	76	66	47
Hydrochloric acid	77	79	47	33	−2
Isopropyl alcohol	14	12	11	16	19
Methanol	197	206	191	180	−4
Nitrogen	47	45	39	30	5
Oxygen	200	214	208	159	−6
Polyethylene, high density	76	82	78	78	−7
Polyethylene, low density	134	88	93	91	51
Propylene	208	191	158	156	9
Propylene tetramer	35	30	38	35	19
Styrene	30	24	29	33	26
Sulfur, recovered	461	377	425	426	22
Toluene	216	223	138	132	−3
Vinyl chloride	132	134	79	57	−2
m- and *p*-Xylene	225	197	99	87	14
o-Xylene	43	39	16	17	11

a Production of Petróleos Mexicanos (Pemex) of primary petrochemicals. **Source:** Pemex

In 1984, East Europe and the Soviet Union continued the moderate upturn in economic growth that began in 1983, following several years of decelerating growth. Overall, industrial output for the region rose 4.4%, surpassing the goal of 4.0%. Only Bulgaria fell short of its plan.

The chemical industry continued to rebound in 1984, as well, led by East Germany's 9.4% production increase. Soviet production of plastics was up 9%, and output of mineral fertilizers, pesticides, and sodium hydroxide rose [illegible]. For many major chemical products the Soviet Union accounts for as much output or more than all the other East European nations combined.

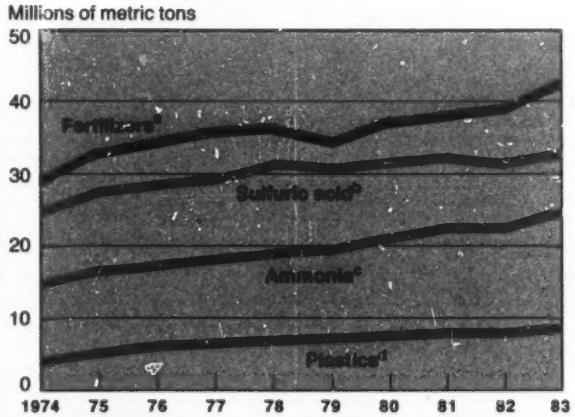
MAN-MADE FIBERS: Growth is moderate for noncellulosics, but cellolosics stagnate

Production, thousands of metric tons	1983	1982	1981	1980	Change 1982–83
NONCELLULOSIC FIBERS[a]					
Bulgaria	60	52	56	54	15%
Czechoslovakia	105	102	90	76	3
East Germany	144	134	134	139	8
Hungary	21	20	21	20	2
Poland	148	128	119	163	15
Romania	156	151	154	136	3
U.S.S.R.	622	594	573	550	5
TOTAL	1256	1182	1148	1139	6%
CELLULOSIC FIBERS					
Bulgaria	39	38	39	36	3%
Czechoslovakia	58	55	54	55	5
East Germany	165	162	169	168	2
Hungary	6	8	8	9	−16
Poland	69	64	64	86	8
Romania	60	58	65	64	2
U.S.S.R.	645	635	646	650	2
TOTAL	1042	1020	1044	1068	2%

a Excluding olefins and textile glass. **Source:** Textile Economics Bureau

Output is rising for several major chemical products

Millions of metric tons



a As N, P_2O_5, and K_2O. b 100% H_2SO_4. c Nitrogen content. d Including resins for man-made fibers in U.S.S.R. **Note:** Data for U.S.S.R., Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania.
Sources: Central Intelligence Agency, Department of Agriculture, C&EN estimates

PRODUCTION GROWTH: Generally higher

% annual change in gross output	1984	1983	1982	1981	1980
U.S.S.R. and East Europe					
All industry	4.4%	4.3%	2.4%	2.2%	3.4%
Bulgaria					
All industry	4.5	3.9	4.6	4.9	4.2
Chemicals and rubber	6.0	5.9	6.4	4.3	11.1
Czechoslovakia					
All industry	3.9	2.8	1.1	2.1	3.5
Chemicals and rubber	na	3.5	1.1	1.7	4.8
East Germany					
All industry[a]	4.2	4.1	3.1	4.7	4.7
Chemicals and rubber	9.4	3.0	5.6	2.5	3.3
Hungary					
All industry	3.0	1.4	2.5	2.4	−2.0
Chemicals and rubber[b]	na	1.4	1.9	3.1	−2.1
Poland					
All industry	5.3	6.4	−2.1	−10.8	0.0
Chemicals and rubber	na	8.1	0.1	−11.4	0.4
Romania					
All industry	6.7	4.7	1.1	2.6	6.5
Chemicals and rubber	na	5.3	1.4	3.9	6.8
U.S.S.R.					
All industry[c]	4.2	4.2	2.9	3.4	3.6
Chemicals and rubber[c]	6.0	5.5	3.0	5.9	5.6
All industry[d]	na	3.5[e]	2.3	2.4	2.9
Chemicals and rubber[d]	na	6.0[e]	1.8	4.0	4.7

a Industrial commodity production. b For state and cooperative industry only. c Figures based on official Soviet statistics. d Figures based on Central Intelligence Agency estimates, giving lower results because of postulated upward bias in official figures. e Preliminary figure. na = not available. **Sources:** United Nations Economic Commission for Europe and Foreign Broadcast Information Service, based on official national statistics; Central Intelligence Agency

AGRICULTURAL CHEMICALS: Fertilizer supplies were relatively unchanged last year

Thousands of metric tons	1984	1983	1982	1981	1980
Bulgaria					
Fertilizer supply[a]	1,015[b]	1,009	1,038	1,044	830
Pesticide supply[c]	na	33.9	40.4	48.6	39.9
Czechoslovakia					
Fertilizer supply[a]	1,750	1,776	1,741	1,720	1,730
East Germany					
Fertilizer supply[a]	1,450[b]	1,451	1,403	1,726	1,637
Pesticide supply[c]	na	26.0	26.7	27.0	27.0
Hungary					
Fertilizer supply[a]	1,510	1,586	1,528	1,485	1,399
Poland					
Fertilizer supply[a]	3,424	3,182	3,346	3,[illegible]6	3,635
Pesticide supply[c]	11.1	14.7	16.3	12.4	9.3
Romania					
Fertilizer supply[a]	1,289	1,157[b]	1,409	1,618	1,185
U.S.S.R.					
Fertilizer supply[a]	23,100	22,977	20,152	19,176	18,763
Nitrogen[a]	10,385[b]	10,302	9,038	8,383	8,262
Phosphate[a,e]	6,465[b]	6,465	6,11[illegible]	5,879	5,590
Potassium[a]	6,240[b]	6,201	4,991	4,905	4,904
Pesticide supply[d]	576	557	533	504	474

a Nutrient content basis, as N, P_2O_5, or K_2O. b Estimated. c On basis of active substance. d On conventional weight basis. e Includes ground phosphate rock. na = not available. **Sources:** Department of Agriculture and Foreign Broadcast Information Service, based on official national statistics

PRODUCTION: Growth was slight last year for several important chemical products

Thousands of metric tons, unless otherwise noted	1984[a]	1983	1982	1981	1980
U.S.S.R.					
Sulfuric acid, 100%	25,300	24,714	23,801	24,095	23,033
Mineral fertilizers[b]	30,800	29,727	26,738	25,999	24,767
Nitrogen[b]	13,225	13,007	11,593	10,705	10,241
Phosphate[b,c]	7,500	7,417	7,057	6,836	6,455
Potassium[b]	10,065	9,294	8,079	8,449	8,064
Synthetic ammonia[d]	na	16,770	14,605	14,718	13,762
Plastics[e]	4,800	4,419	4,058	4,089	3,637
Sodium hydroxide, 100%	2,970	2,853	2,783	2,757	2,755
Synthetic rubber[f]	na	1,810	1,795	1,860	1,880
Pesticides[g]	576	557	533	504	474
Rubber tires[h] (thousands of units)	63,700	62,000	61,700	60,500	60,100
BULGARIA					
Sulfuric acid, 100%	908	861	916	920	852
Mineral fertilizers[b]	695	687	698	710	653
Nitrogen[b]	486	483	459	453	436
Phosphate[b]	209	204	239	258	217
Synthetic ammonia[d]	na	1,124	1,033	1,023	1,009
Plastics	na	398	337	290	255
Sodium hydroxide, 100%	163	147	155	151	162
Synthetic rubber	na	25	25	30	30
Pesticides[i]	na	21	20	20	19
CZECHOSLOVAKIA					
Sulfuric acid, 100%	1,246	1,244	1,252	1,315	1,284
Mineral fertilizers[b]	1,191	1,175	1,166	1,139	1,233
Nitrogen[b]	576	591	568	539	618
Phosphate[b,c]	398	378	387	394	412
Potassium[b,g]	217	206	211	206	203
Synthetic ammonia[d]	na	809	726	711	841
Plastics	1,039	1,006	956	913	894
Sodium hydroxide, 100%	na	330	324	330	324
Synthetic rubber	na	67	66	63	60
Pesticides[i]	na	16	16	16	16
EAST GERMANY					
Sulfuric acid, 100%	na	926	920	948	958
Mineral fertilizers[b]	na	4,714	4,669	4,787	4,735
Nitrogen[b]	1,026	968	948	967	943
Phosphate[b,c]	na	315	286	360	370
Potassium[b]	3,465	3,431	3,434	3,460	3,422
Synthetic ammonia[d]	na	1,210	1,167	1,203	1,181
Plastics	na	1,030	990	998	861
Sodium hydroxide, 100%	na	687	695	631	626
Synthetic rubber	na	155	155	155	150
Pesticides[i]	na	54	53	53	51
Rubber tires[g] (thousands of units)	na	7,420	7,056	7,026	7,067
HUNGARY					
Sulfuric acid, 100%	568	625	589	546	608
Mineral fertilizers[b]	1,109	1,110	1,071	1,112	1,045
Nitrogen[b]	678	684	660	684	649
Phosphate[b]	269	282	269	276	257
Potassium[b,j]	162	140	142	152	139
Synthetic ammonia[d]	na	812	792	819	795
Plastics	na	345	326	314	328
Sodium hydroxide, 100%[k]	na	192	178	180	189
Pesticides[i]	36	36	26	29	28
POLAND					
Sulfuric acid, 100%	2,770	2,786	2,676	2,776	3,019
Mineral fertilizers[b]	2,356	2,323	2,284	2,241	2,238
Nitrogen[b]	1,369	1,341	1,298	1,274	1,290
Phosphate[b]	869	872	868	866	843
Potassium[b,j]	118	111	118	101	105
Synthetic ammonia[d]	na	1,430	1,384	1,465	1,483
Plastics	619	559	479	504	576
Sodium hydroxide, 100%	379	392	363	401	416
Synthetic rubber	119	120	100	111	118
Pesticides[i]	na	9	9	8	10
Rubber tires[h] (thousands of units)	8,104	7,890	5,693	na	8,743
ROMANIA					
Sulfuric acid, 100%	na	na	1,600	1,814	1,756
Mineral fertilizers[b]	3,073	2,913	2,692	2,640	2,451
Nitrogen[b]	na	2,091	2,008	1,822	1,707
Synthetic ammonia[d]	na	2,723	2,583	2,383	2,247
Plastics	na	633	591	584	579
Sodium hydroxide, 100%	na	745	760	707	723
Synthetic rubber	159	147	160	146	150
Pesticides[i]	na	48	45	43	40

a Approximate figures. b Nutrient content basis, as N, P_2O_5, or K_2O. c Including production of ground phosphate rock for direct applications and phosphate animal feeds. d Nitrogen content. e Including resins for man-made fibers. f Estimated. g On conventional weight basis. h For all motor vehicle tires, excluding aircraft and bicycle tires. i On basis of active substance. j Imported potash added to domestically produced nitrogen and phosphate to form multinutrient fertilizer. k Including regenerated NaOH. na = not available. **Sources:** Central Intelligence Agency, Department of Agriculture, Foreign Broadcast Information Service, and PlanEcon Inc., based on official national statistics

SOVIET FOREIGN TRADE: Little change last year in dollar value

$ Millions	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
Exports[a]	$91,120	$91,469	$87,168	$79,377	$76,437	$64,912	$52,435	$45,227	$37,269	$33,407	$27,374
Imports[a]	80,026	80,285	77,847	73,158	68,473	57,958	50,798	40,926	38,212	37,070	24,861
Trade balance	11,094	11,184	9,321	6,219	7,964	6,954	1,637	4,301	−943	−3,663	2,513
Chemical exports[a]	na	2,300[b]	2,309	2,380	2,139	1,606	1,284	1,063	939	1,027	887
Chemical imports[a]	na	2,800[b]	3,886	4,031	3,732	2,803	2,186	1,850	1,668	1,747	1,448
Chemical trade balance	na	−500[b]	−1,577	−1,651	−1,593	−1,197	−904	−787	−729	−720	−561

a Free on board. b Approximate values. na = not available. **Sources:** Central Intelligence Agency, PlanEcon Inc., based on official Soviet statistics and exchange rates

KOREA

INDUSTRY TRENDS: Sharp gains in 1984

Index, 1980 = 100	1984	1983	1982	1981	Change 1983–84
Chemicals, petroleum, coal, rubber, and plastic products					
Production	140.7	123.7	105.9	102.5	14%
Shipments	132.6	119.5	102.4	101.6	11
Inventories	125.2	119.5	115.4	115.0	5
Industrial chemicals					
Production	126.4	116.0	101.8	103.7	9
Shipments	134.4	124.5	108.2	105.4	8
Inventories	117.3	114.2	121.1	126.9	3
Other chemical products					
Production	160.8	141.7	122.5	106.1	13
Shipments	158.7	139.2	119.4	106.7	14
Inventories	159.3	141.6	118.5	94.7	12
Rubber products					
Production	158.4	120.3	99.2	99.4	32
Shipments	158.2	120.1	98.3	95.3	32
Inventories	138.2	99.8	87.2	109.8	38
Plastic products					
Production	145.3	124.2	92.9	91.6	17
Shipments	146.1	123.6	92.6	91.3	18
Inventories	139.9	132.0	121.9	96.5	6
All manufacturing					
Production	160.6	139.0	119.4	113.4	16
Shipments	153.6	135.8	116.2	111.3	13
Inventories	138.0	126.0	126.5	110.8	10

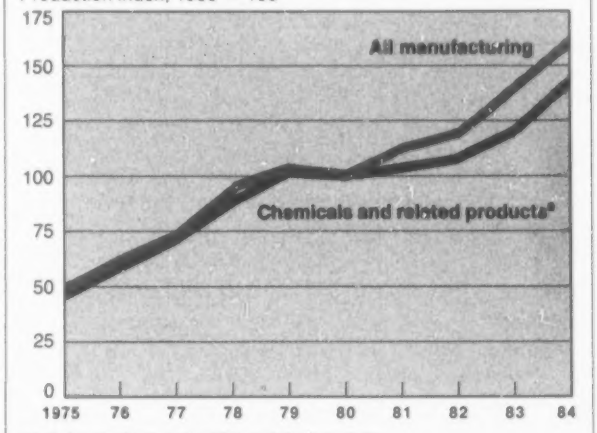
Source: Korean Bureau of Statistics

FOREIGN TRADE: Chemical deficit widens

$ Millions	1984	1983	1982	1981
Exports[a]	$29,245	$24,445	$21,853	$21,254
Imports[b]	30,631	26,192	24,251	26,131
Trade balance	−1,386	−1,747	−2,398	−4,877
Chemical exports	918	747	740	682
Chemical imports	2,762	2,279	2,084	2,109
Chemical trade balance	1,844	1,532	−1,344	−1,427

a Free on board. b Includes cost, insurance, freight. **Source:** Korean Bureau of Statistics

Production of chemicals lags behind manufacturing output overall



a Includes petroleum, coal, rubber, and plastic products.
Source: Korean Bureau of Statistics

PRODUCTION: Last year was strong

Thousands of metric tons	1984	1983	1982	1981	Change 1983–84
Sulfuric acid	1975	1610	1596	1304	23%
Complex fertilizers	1861	1614	1667	1211	15
Ammonia	565	523	661	908	8
Urea fertilizers	858	737	788	1070	16
Ethylene	526	491	374	374	7
Polyethylene	317	279	218	200	14
Polyester fibers	265	217	189	193	22
Insecticides	110	87	58	54	27
Synthetic detergents	62	57	52	57	8

Sources: Korean Bureau of Statistics, Korean Economic Planning Board

AUSTRALIA

PRODUCTION: Plastics bounce back

Thousands of metric tons	1984[a]	1983[a]	1982[a]	1981[a]	Change 1983–84
Chemicals and acids					
Hydrochloric acid, 100%	57	60	55	59	−5%
Nitric acid, 100%	189	189	180	182	0
Sulfuric acid, 100%	1726	1782	2027	1963	−3
Ammonium sulfate	217	200	207	211	8
Superphosphate[b]	2663	2986	3568	3770	−11
Plastics and resins	820	720	801	789	14
Synthetic detergents	221	216	211	200	2
Unsupported plastics film, sheeting	122	114	119	125	7
Polyethylene[c]	90	81	82	84	11
Polyvinyl chloride[d]	14	17	18	18	−17

a Years ending June 30. b Includes double and triple superphosphates and ammonium phosphate expressed in terms of single phosphate (22% P_2O_5 equivalent). c Low and high density. d Including copolymers. **Source:** Australian Bureau of Statistics

FOREIGN TRADE: Chemical imports rise fast

$ Millions	1984[a]	1983[a]	1982[a]	1981[a]
Exports[b,c]	$22,488	$20,812	$20,939	$22,314
Imports[d]	21,847	20,515	24,608	22,068
Trade balance	641	297	−3,669	246
Chemical exports[b,c]	455	431	430	487
Medicinal products	108	102	95	95
Chemical imports[d]	1,953	1,671	1,955	1,842
Organic chemicals	550	441	530	509
Resins, plastic materials	441	343	460	416
Medicinal products	201	182	166	164
Chemical trade balance	−1,498	−1,240	−1,525	−1,355

a Years ending June 30. b Free on board. c Includes re-exports. d Values for customs purposes, free-on-board basis. **Source:** Australian Bureau of Statistics

5. Foreign Chemical Industries—Western Pacific

CHINA

PRODUCTION: Fibers and fertilizers scored big gains last year

Thousands of metric tons, unless otherwise noted	1984	1983	1982	1981	Change 1983–84
Fertilizer[a]	14,820	13,789	12,781	12,390	8%
Nitrogen (N)	12,260	11,094	10,218	9,857	10
Phosphate (P_2O_5)[b]	2,520	2,665	2,537	2,508	−5
Potash (K_2O)	40	29	25	26	38
Sulfuric acid, 100%	8,130	8,695	8,174	7,807	−6
Sodium hydroxide	2,220	2,123	2,073	1,923	5
Sodium carbonate	1,880	1,793	1,735	1,652	5
Calcium carbide	na	1,807	1,674	1,513	na

Thousands of metric tons, unless otherwise noted	1984	1983	1982	1981	Change 1983–84
Plastics	1,160	1,121	1003	916	3%
Man-made fibers	730	544	517	527	34
Synthetic detergents	810	680	569	478	19
Ethylene	648	654	565	505	−1
Pesticides	310	332	457	484	−7
Pharmaceuticals	52	48	42	37	9
Synthetic rubber	na	169	136	125	na
Rubber tires[c]	15,345	12,710	8630	7290	21

a Nutrient content. b Including production of ground phosphate rock for direct application and phosphate animal feeds. c Not including wheelbarrow and bicycle tires. **na** = not available. **Sources:** State Statistical Bureau of the People's Republic of China, Chinese Ministry of Chemical Industry

CHEMICAL IMPORTS: Plastics, fertilizers dip

$ Millions[a]	1983	1982	1981	Change 1982–83
Fertilizers[b]	$ 574	$ 622	$ 766	−8%
Nitrogenous fertilizer	199	351	455	−43
Chemical elements and compounds	572	521	475	10
Organic chemicals	416	415	381	0
Plastic materials, resins	570	634	482	−10
Dyeing, tanning, and coloring materials	116	141	116	−18
Medicinal products	43	34	30	26
Essential oils, perfume, and cleansing materials	39	22	16	77
Other chemicals[c]	318	196	160	62
TOTAL	**$2233**	**$2170**	**$2046**	3%

a Free on board. b Manufactured. c Includes explosives and pyrotechnic products; mineral tar and crude chemicals from coal, oil, and natural gas; and chemical materials and products not elsewhere specified. **Source:** Central Intelligence Agency, estimated from data reported by China's trade partners

CHEMICAL EXPORTS: Little change overall

$ Millions[a]	1983	1982	1981	Change 1982–83
Chemical elements and compounds	$ 541	$ 581	$ 583	−7%
Organic chemicals	304	308	326	−1
Medicinal products	237	223	215	6
Explosives and pyrotechnic products	113	110	96	3
Essential oils, perfume, and cleansing materials	110	98	97	12
Dyeing, tanning, and coloring materials	82	71	67	15
Plastic materials, resins	54	43	67	24
Mineral tar and crude chemicals[b]	16	31	23	−48
Fertilizers[c]	3	3	1	7
Other chemical products	135	137	188	−1
TOTAL	**$1290**	**$1297**	**$1335**	−1%

a Free on board. b From coal, oil, and natural gas. c Manufactured. **Source:** Central Intelligence Agency, estimated from data reported by China's trade partners

TAIWAN

INDUSTRY TRENDS: Fertilizers are only laggard

Industrial production indexes, 1981 = 100	1984	1983	1982	1981	Change 1983–84
All manufacturing	132.2	117.0	101.3	100.0	13%
Chemical materials	139.6	115.4	99.6	100.0	21
Basic chemicals	118.6	107.1	99.7	100.0	11
Petrochemicals	144.8	114.3	95.3	100.0	27
Fertilizers	75.2	74.0	72.8	100.0	2
Synthetic fibers	136.6	117.8	104.1	100.0	16
Plastics and resins	153.1	123.8	105.0	100.0	24
Chemical products	141.8	125.2	116.4	100.0	13

Source: Taiwan Ministry of Economic Affairs

FOREIGN TRADE: Wider gap for chemicals

$ Millions	1984	1983	1982	1981
Exports[a]	$30,456	$25,123	$22,204	$22,611
Imports[b]	21,959	20,287	18,888	21,200
Trade balance	8,497	4,836	3,316	1,411
Chemical exports[a,c]	1,244	1,041	1,012	973
Chemical imports[b,c]	3,203	2,814	2,312	2,705
Chemical trade balance	−1,959	−1,773	−1,299	−1,731

a Free on board. b Includes cost, insurance, and freight. c For chemicals and chemical products. **Sources:** Taiwan Council for Economic Planning & Development, C&EN estimates

PRODUCTION: Olefins, aromatics up strongly

Thousands of metric tons, unless otherwise noted	1984	1983	1982	1981	Change 1983–84
Man-made fibers	970	840	730	687	16%
Sulfuric acid	762	678	685	819	12
Polyvinyl chloride	634	522	459	456	21
Ethylene	660	499	452	443	32
Vinyl chloride	492	458	434	411	7
Ammonium sulfate	434	381	373	504	14
Ammonia, anhydrous	327	378	386	494	−14
Sodium hydroxide	351	295	359	373	19
Xylene[a]	334	275	230	277	21
Compound fertilizer	301	275	247	330	9
Propylene	341	250	225	204	37
Hydrochloric acid	241	212	191	184	13
Benzene[a]	281	182	130	137	54
Urea	179	171	175	285	5
Calcium superphosphate	177	159	160	226	11
Ethylene glycol	189	151	120	156	25
Oxygen[b]	198	125	164	174	58
Toluene[a]	195	115	113	172	70
Paints	123	108	97	84	15

a Millions of liters. b Millions of cubic meters. **Source:** Taiwan Ministry of Economic Affairs